

«Ο νους του ανθρώπου φαινόμενα μονάχα μπορεί να συλλάβει, ποτέ την ουσία' κι όχι όλα τα φαινόμενα, παρά μονάχα τα φαινόμενα της ύλης' κι ακόμα στενότερα: όχι καν τα φαινόμενα τούτα της ύλης, παρά μονάχα τους μεταξύ τους συνειρμούς' κι οι συνειρμοί τούτοι δεν είναι πραγματικοί, ανεξάρτητοι από τον άνθρωπο' είναι κι αυτοί γεννήματα του ανθρώπου' και δεν είναι οι μόνοι δυνατοί ανθρώπινοι' παρά μονάχα οι πιο βολικοί για τις πραχτικές και νοητικές του ανάγκες.»

N. Καζαντζάκης, «Ασκητική»

Ευχαριστίες

Θα ήθελα να ευχαριστήσω θερμά όσους συνέβαλλαν στην εκπόνηση της παρούσης. Κυρίως θα ήθελα να εκφράσω τις ειλικρινείς μου ευχαριστίες στον Αναπληρωτή Καθηγητή κ. Θεόδωρο Μαριόλη (Τμήμα Δημόσιας Διοίκησης, Πάντειο Πανεπιστήμιο), ο οποίος στάθηκε βασικός παράγοντας στην εξέλιξη μου στην Οικονομική Επιστήμη τόσο σε προπτυχιακό όσο και σε μεταπτυχιακό επίπεδο, καθώς και για την καθοδήγηση και τις υποδείξεις του κατά την συγγραφή της εν λόγω εργασίας. Επίσης, είναι τιμή για εμένα η εμπιστοσύνη και η πίστη που έδειξε στις δυνατότητές μου για την εκπόνηση της διπλωματικής μου εργασίας. Τέλος θα ήθελα να ευχαριστήσω τον υποψήφιο διδάκτορα κ. Γεώργιο Σώκλη (Τμήμα Δημόσιας Διοίκησης, Πάντειο Πανεπιστήμιο) για την βοήθειά του στην εύρεση των εμπειρικών στοιχείων που χρησιμοποιήθηκαν στην παρούσα εργασία, για τις πολύτιμες συμβουλές του και τις διαφωτιστικές συζητήσεις μας, χωρίς τις οποίες η παρούσα εργασία δεν θα είχε πραγματοποιηθεί.

Σας ευχαριστώ πολύ!

Ευγενία Ζούβελα

ΠΕΡΙΛΗΨΗ

Ως γνωστόν η ‘Αυστριακή’ θεωρία των τιμών και του κεφαλαίου θα πρέπει να θεωρείται, στη βάση της κριτικής του Sraffa (1960, ch.6), ξεπερασμένη. Ωστόσο, οι σχέσεις που συγκροτούν την εν λόγω θεωρία μπορεί να θεωρηθούν ως προσεγγιστικές και, επομένως, είναι δυνατός ο εμπειρικός έλεγχός της. Σκοπός της παρούσης είναι ο εμπειρικός έλεγχος της ‘Αυστριακής’ θεωρίας με τη χρήση πινάκων εισροών-εκροών της Φινλανδικής οικονομίας των ετών 1995 και 2004. Τα εμπειρικά αποτελέσματα καταδεικνύουν ότι η ‘Αυστριακή’ θεωρία είναι, ως προσεγγιστική εμπειρική θεωρία των τιμών, αρκετά αξιόπιστη. Επιπλέον, συγκρίνοντας τα εμπειρικά αποτελέσματα της παρούσης με τα ευρήματα των εργασιών που ασχολούνται με την εμπειρική διάσταση της ‘εργασιακής θεωρίας της αξίας’, βρίσκουμε ότι η ‘Αυστριακή’ θεωρία υπερτερεί ως προς την προβλεπτική της ικανότητα έναντι της ‘εργασιακής θεωρίας της αξίας’.

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Εισαγωγή

Σκοπός της παρούσης μελέτης είναι ο εμπειρικός έλεγχος ορισμένων σχέσεων που ενέχονται στην ‘Αυστριακή’ θεωρία¹ των τιμών και του κεφαλαίου (η οποία θα πρέπει να θεωρείται, στη βάση της κριτικής του Sraffa, ξεπερασμένη). Ειδικότερα, θεωρούμε τις σχέσεις που συγκροτεί η εν λόγω θεωρία, όσον αφορά στον προσδιορισμό των τιμών παραγωγής και των μεταβολών των τιμών παραγωγής συνεπεία μεταβολής της κατανομής του εισοδήματος, ως προσεγγιστικές σχέσεις και διερευνούμε πώς είναι δυνατόν να ελεγχθεί, η ακρίβειά των, βάσει εμπειρικών πινάκων εισροών – εκροών.

Το πρώτο μέρος της παρούσης εκθέτει το θεωρητικό πλαίσιο του ζητήματος.

Στο πρώτο κεφάλαιο αναλύουμε βάσει ενός μονοτομεακού συστήματος, την θεμελιώδη για την ‘Αυστριακή’ θεωρία έννοια, ήτοι την έννοια της ‘μέσης περιόδου παραγωγής’, και την σχέση της με την έννοια της ‘έντασης κεφαλαίου’.

Στο δεύτερο κεφάλαιο επεκτείνεται η συζήτηση σε ένα πολυτομεακό σύστημα *à la* Sraffa (1960, Part I) και συγκροτεί τις σχέσεις εκείνες επί των οποίων δύναται να βασισθεί ο εμπειρικός έλεγχος της ‘Αυστριακής’ θεωρίας.

Στο τέλος του πρώτου μέρους της έκθεσης συνοψίζονται τα συμπεράσματα της θεωρητικής ανάλυσης.

Στο δεύτερο μέρος της εργασίας γίνεται η εμπειρική ανάλυση.

Το τρίτο κεφάλαιο αναφέρεται στην πραγματοποίηση του εμπειρικού ελέγχου, ήτοι παρουσιάζονται τα εμπειρικά δεδομένα που χρησιμοποιούνται για τους υπολογισμούς.

Τέλος, στο τέταρτο κεφάλαιο σχολιάζουμε και ερμηνεύουμε τα αποτελέσματα και συνοψίζουμε τα συμπεράσματά μας.

¹ Για την αναλυτική παρουσίαση της ‘Αυστριακής’ θεωρίας των τιμών και του κεφαλαίου, βλ. Burmeister (1975). Για την κριτική της, σε όρους της σραφφαϊανής ανάλυσης, βλ. Howard (1980) και Kurz and Salvadori (1995, ch. 14 και ιδίως pp. 432-448).

Ως γνωστόν, υπάρχουν πλήθος εμπειρικών εργασιών οι οποίες μετρούν τις αποκλίσεις μεταξύ εργασιακών αξιών και τιμών και επομένως έχει ενδιαφέρον να συγκρίνουμε την προβλεπτική ικανότητα των εργασιακών αξιών με την αντίστοιχη των Αυστριακών τιμών.

ΜΕΡΟΣ ΠΡΩΤΟ

Το Θεωρητικό Πλαίσιο

Εισαγωγή

Η παρούσα μελέτη επιχειρεί έναν εμπειρικό έλεγχο της ‘Αυστριακής’ θεωρίας των τιμών και του κεφαλαίου.

Θα ερμηνεύσουμε την έννοια της ‘μέσης περιόδου παραγωγής’ και την σχέση της με την έννοια της έντασης κεφαλαίου. Στη συνέχεια θα αναφερθούμε σε ένα πολυτομιακό σύστημα *à la* Sraffa . Τέλος, θα εκθέσουμε τις σχέσεις στις οποίες είναι δυνατόν να βασισθεί ο εμπειρικός έλεγχος της ‘Αυστριακής’ θεωρίας.

Στα αμέσως ακόλουθα περιγράψουμε το θεωρητικό υπόδειγμα της μελέτης.

1.Η Μέση Περίοδος Παραγωγής και η Ένταση Κεφαλαίου²

Θεωρούμε μια ‘flow input-point output’ διαδικασία παραγωγής μίας (1) μονάδας τελικού προϊόντος, η οποία διαρκεί t περιόδους:

$$l_t + l_{t-1} + l_{t-2} + \dots + l_1 \rightarrow 1 \quad (1)$$

όπου το l_h παριστά τις μονάδες εργασίας που αναλώθηκαν h περιόδους προτού παραχθεί το τελικό προϊόν, $h = 1, 2, \dots, t$. Σύμφωνα με τον Böhm-Bawerk η ‘μέση περίοδος παραγωγής’³, T , της εν λόγω διαδικασίας ορίζεται ως

$$T \equiv \frac{l_1 + 2l_2 + \dots + (t-2)l_{t-2} + (t-1)l_{t-1} + tl_t}{l_1 + l_2 + \dots + l_{t-2} + l_{t-1} + l_t}$$

ή

$$T \equiv \frac{\sum_{h=1}^t hl_h}{\sum_{h=1}^t l_h} \quad (2)$$

και θεωρείται ότι αποτελεί ένα μέτρο της ‘έντασης κεφαλαίου’ (capital intensity) της διαδικασίας, εκφρασμένης σε όρους του χρηματικού ωρομισθίου, w . Ας δούμε τον συλλογισμό στον οποίο βασίζεται η συσχέτιση, μέσης περιόδου παραγωγής-έντασης

² Το παρόν κεφάλαιο έχει βασισθεί πλήρως στο Μαριόλης (2008).

³ Αυτό το κεφάλαιο βασίζεται στον Howard (1980, pp. 4-9). Για μία πιο φορμαλιστική έκθεση της έννοιας ‘μέση περίοδος παραγωγής’, βλ. Orosel (1987).

κεφαλαίου. Εάν p είναι η τιμή μίας μονάδας του τελικού προϊόντος και r είναι το επιτόκιο (ή ποσοστό κέρδους), τότε ο μηδενισμός της ‘παρούσης αξίας’ της διαδικασίας (1), υπολογιζόμενη με τη λεγόμενη ‘μέθοδο του σύνθετου τόκου ή ανατοκισμού’, συνεπάγεται ότι

$$wl_t + [wl_{t-1}/(1+r)] + [wl_{t-2}/(1+r)^2] + \dots + [wl_1/(1+r)^t] = p/(1+r)^t$$

ή, πολλαπλασιάζοντας με $(1+r)^t$,

$$wl_t(1+r)^t + wl_{t-1}(1+r)^{t-1} + wl_{t-2}(1+r)^{t-2} + \dots + wl_1(1+r) = p \quad (3)$$

Το μέγεθος $v \equiv \sum_{h=1}^t l_h$ παριστά τη συνολική ποσότητα εργασίας, η οποία αναλώθηκε, άμεσα και έμμεσα, στην παραγωγή του τελικού προϊόντος, και το $W \equiv wn$ παριστά τους συνολικούς χρηματικούς μισθούς. Έτσι, εάν αφαιρέσουμε το W από το αριστερό μέλος της (3), λαμβάνουμε, εξορισμού, τα συνολικά κέρδη, P , ήτοι

$$P \equiv \left[\sum_{h=1}^t wl_h(1+r)^h \right] - W \quad (4)$$

Διαιρώντας το P με r , λαμβάνουμε, εξορισμού, τη χρηματική αξία του συνολικού κεφαλαίου, K , ήτοι

$$K \equiv P/r \quad (5)$$

Τέλος, διαιρώντας την (5) με W λαμβάνουμε την ένταση κεφαλαίου της διαδικασίας, k , σε όρους του χρηματικού ωρομισθίου, ήτοι

$$k \equiv K/W = \left[\sum_{h=1}^t l_h(1+r)^h - \sum_{h=1}^t l_h \right] / \left(r \sum_{h=1}^t l_h \right) \quad (6)$$

Είναι σαφές ότι η ‘μέση περίοδος παραγωγής’, T , δεν δύναται να θεωρηθεί ως ένα μέτρο του k (εξάλλου το πρώτο είναι ανεξάρτητο του r , ενώ το δεύτερο αποτελεί μία γνησίως αύξουσα συνάρτηση του r). Ωστόσο, εάν θεωρηθεί ότι η ‘παρούσα αξία’ της διαδικασίας (1) υπολογίζεται σύμφωνα με την λεγόμενη ‘μέθοδο του απλού τόκου’, τότε η (3) γίνεται

$$wl_t(1+tr) + wl_{t-1}[1+(t-1)r] + wl_{t-2}[1+(t-2)r] + \dots + wl_1(1+r) = p \quad (7)$$

και, τελικά (δηλ. εάν επαναλάβουμε τη διαδικασία 'διάσπασης' της τιμής σε μισθούς και κέρδη), στη θέση της (6) έχουμε

$$k \equiv \left[\sum_{h=1}^t l_h (1+hr) - \sum_{h=1}^t l_h \right] / \left(r \sum_{h=1}^t l_h \right)$$

ή $k = T$ (8)

ενώ η (7) γράφεται

$$wv(1+rT) = p$$
 (9)

Θα είναι προφανές ότι η (8) προκύπτει άμεσα από την (6), εάν στην τελευταία θέσουμε

$$(1+r)^h = 1+hr, \forall h=1,2,\dots,t$$
 (10)

ή, διαφορετικά μπορούμε να πούμε, ότι η ακρίβεια της προσέγγισης $k \approx T$ συναρτάται ευθέως με την ακρίβεια της προσέγγισης

$$(1+r)^h \approx 1+hr$$
 (11)

η οποία, με τη σειρά της, είναι τόσο υψηλότερη όσο μικρότερες είναι οι τιμές του r και του h .⁴

2.Γενίκευση σε ένα πολυτομιακό σύστημα *à la Sraffa*⁵

Θεωρούμε το σύνηθες, γραμμικό, κερδοφόρο σύστημα απλής παραγωγής, χωρίς πάγιο κεφάλαιο, με ομοιογενή εργασία και με ενιαίο ποσοστό κέρδους. Έτσι, εάν οι

⁴ Παράδειγμα: Για $r = 5\%$ και $t = 5$ η προσέγγιση δίνει 1.25, ενώ $(1.05)^5 \approx 1.2763$. Για $r = 30\%$ και $t = 5$, η προσέγγιση δίνει 2.5, ενώ $(1.3)^5 \approx 3.7$. Τέλος, για $r = 5\%$ και $t = 10$, η προσέγγιση δίνει 1.5, ενώ $(1.05)^{10} \approx 1.630$. Γενικά, ισχύει, ως γνωστόν, το εξής:

$$(1+r)^h = 1+hr + \frac{h(h-1)}{2!} r^2 + \dots + \frac{h(h-1)(h-k+1)}{k!} r^k + \dots$$

όπου η σειρά, στο δεξιό μέλος, έχει πεπερασμένο πλήθος όρων (δεδομένου ότι το h είναι, εδώ, θετικός ακέραιος).

⁵ Το παρόν κεφάλαιο έχει βασισθεί πλήρως στο Μαριόλης (2008).

μισθοί καταβάλλονται εξολοκλήρου στην αρχή της ενιαίας περιόδου παραγωγής, το σύστημα των τιμών γράφεται:

$$\mathbf{p}^T = (1+r)(\mathbf{p}^T \mathbf{A} + w\mathbf{l}^T) \quad (12)$$

όπου $\mathbf{p}(> \mathbf{0})$ είναι το διάνυσμα των τιμών των εμπορευμάτων, \mathbf{A} η μήτρα των τεχνικών συντελεστών, και $\mathbf{l}(> \mathbf{0})$ το διάνυσμα των εισροών σε άμεση, ομοιογενή εργασία ανά μονάδα παραγόμενου εμπορεύματος. Η σραφραϊανή αναγωγή των τιμών σε ‘χρονολογημένες ποσότητες εργασίας’ (‘dated quantities of labour’ – βλ. Sraffa, 1960, §46) δίνει

$$\mathbf{p}^T = w[(1+r)\mathbf{l}^T + (1+r)^2\mathbf{l}^T \mathbf{A} + (1+r)^3\mathbf{l}^T \mathbf{A}^2 + (1+r)^4\mathbf{l}^T \mathbf{A}^3 + \dots]$$

ή

$$\mathbf{p}^T = w[(1+r)\mathbf{l}_1^T + (1+r)^2\mathbf{l}_2^T + (1+r)^3\mathbf{l}_3^T + (1+r)^4\mathbf{l}_4^T + \dots] \quad (13)$$

όπου $\mathbf{l}_h^T \equiv \mathbf{l}^T \mathbf{A}^{h-1}$, $h = 1, 2, \dots$.⁶ Χρησιμοποιώντας την προσέγγιση (11), η (13)

γράφεται

$$\mathbf{p}^T \approx w[(1+r)\mathbf{l}_1^T + (1+2r)\mathbf{l}_2^T + (1+3r)\mathbf{l}_3^T + (1+4r)\mathbf{l}_4^T + \dots]$$

ή

$$\mathbf{p}^T \approx w\left(\sum_{h=1}^{\infty} \mathbf{l}_h^T + r \sum_{h=1}^{\infty} h\mathbf{l}_h^T\right)$$

ή

$$\mathbf{p}^T \approx w\mathbf{v}^T (\mathbf{I} + r\hat{\mathbf{T}}) \quad (14)$$

όπου το

$$\mathbf{v}^T \equiv \sum_{h=1}^{\infty} \mathbf{l}_h^T = \mathbf{l}^T [\mathbf{I} - \mathbf{A}]^{-1} \quad (15)$$

⁶ Παρατήρησε σε αντιστοιχία, με τις (1) και (3), ότι η (13) δύναται να θεωρηθεί ως εκφράζουσα το μηδενισμό της ‘παρούσης αξίας’ των ακολούθων n (στο πλήθος) διαδικασιών παραγωγής, διάρκειας άπειρων περιόδων,

$$\dots + \mathbf{l}^T \mathbf{A}^h + \mathbf{l}^T \mathbf{A}^{h-1} + \mathbf{l}^T \mathbf{A}^{h-2} + \dots + \mathbf{l}^T \mathbf{A} + \mathbf{l}^T \rightarrow \mathbf{e}$$

όπου το $\mathbf{e} \equiv [1, 1, \dots, 1]^T$ παριστά τα διανύσματα των τελικών προϊόντων.

παριστά το διάνυσμα των ποσοτήτων άμεσης και έμμεσης εργασίας που απαιτούνται για την παραγωγή των επιμέρους εμπορευμάτων ή, αλλιώς, το διάνυσμα των ‘εργασιακών αξιών’ των εμπορευμάτων, \mathbf{I} είναι η μοναδιαία μήτρα,

$$\hat{\mathbf{T}} \equiv [\mathbf{T}_i] \equiv \hat{\mathbf{v}}^{-1} \hat{\mathbf{z}} \quad (16)$$

η διαγώνια μήτρα των ‘μέσων περιόδων παραγωγής’ των επιμέρους διαδικασιών παραγωγής του συστήματος, $\hat{\mathbf{v}}$ η διαγώνια μήτρα που σχηματίζεται από τα στοιχεία του διανύσματος \mathbf{v} , και $\hat{\mathbf{z}}$ η διαγώνια μήτρα που σχηματίζεται από τα στοιχεία του διανύσματος⁷

$$\mathbf{z}^T \equiv \sum_{h=1}^{\infty} h \mathbf{l}_h^T = \mathbf{v}^T [\mathbf{I} - \mathbf{A}]^{-1} \quad (17)$$

Εάν τυποποιήσουμε τις τιμές με το ‘Πρότυπο εμπόρευμα’ (Standard commodity) του Sraffa (1960, chs 4-5), ήτοι

$$\mathbf{p}^T \mathbf{u} = 1, \text{ όπου } \mathbf{u} \equiv [\mathbf{I} - \mathbf{A}] \mathbf{q} \text{ και } \mathbf{l}^T \mathbf{q} = 1 \quad (18)$$

ή

$$\mathbf{p}^T \mathbf{q} = \mathbf{v}^T \mathbf{q} = (1 - \lambda)^{-1} = (1 + R) R^{-1} \quad (19)$$

όπου \mathbf{q} είναι το δεξιό Perron-Frobenius (P-F εφεξής) ιδιοδιάνυσμα της μήτρας \mathbf{A} , $\lambda (< 1)$ η P-F ιδιοτιμή αυτής, και $R \equiv (1 - \lambda) \lambda^{-1}$ είναι το μέγιστο ποσοστό κέρδους του συστήματος, τότε από την (14) λαμβάνουμε (αγνοώντας, εφεξής, τον προσεγγιστικό χαρακτήρα αυτής)

$$\mathbf{p}^T \mathbf{u} = w \mathbf{v}^T (\mathbf{I} + r \hat{\mathbf{T}}) \mathbf{u}$$

ή

$$1 = w(1 + r \mathbf{v}^T \hat{\mathbf{T}} \mathbf{u})$$

ή, ανακαλώντας την (16),

⁷ Σημειώνεται η αντιστοιχία ανάμεσα στην (14) και την (9). Επίσης, όπως εύκολα αποδεικνύεται,

$$\mathbf{I} + 2\mathbf{A} + 3\mathbf{A}^2 + 4\mathbf{A}^3 + 5\mathbf{A}^4 + \dots = [\mathbf{I} - \mathbf{A}]^{-1} [\mathbf{I} - \mathbf{A}]^{-1}$$

$$1 = w(1 + r\mathbf{v}^T \hat{\mathbf{v}}^{-1} \hat{\mathbf{z}}\mathbf{u})$$

ή, ανακαλώντας την (17),

$$1 = w(1 + r\mathbf{v}^T \mathbf{q})$$

ή, ανακαλώντας την (19),

$$1 = w[1 + r(1 + R)R^{-1}]$$

ή, τέλος,

$$w = (1 + rT_q)^{-1} \quad (20)$$

όπου το

$$T_q \equiv \frac{\mathbf{I}^T \mathbf{u} + 2\mathbf{I}^T \mathbf{A} \mathbf{u} + 3\mathbf{I}^T \mathbf{A}^2 \mathbf{u} + \dots}{\mathbf{I}^T \mathbf{u} + \mathbf{I}^T \mathbf{A} \mathbf{u} + \mathbf{I}^T \mathbf{A}^2 \mathbf{u} + \dots} = \frac{(1-\lambda)(1-\lambda)^2}{(1-\lambda)(1-\lambda)^{-1}} = (1-\lambda)^{-1} = (1+R)R^{-1} (> 1) \quad (21)$$

παριστά τη ‘μέση περίοδο παραγωγής’ του σραφφαϊανού προτύπου εμπορεύματος.⁸

Εισάγοντας την (20) στην (14) λαμβάνουμε

$$\mathbf{p}^T = (1 + rT_q)^{-1} \mathbf{v}^T (\mathbf{I} + r\hat{\mathbf{T}}) \quad (22)$$

Και, παραγωγίζοντας ως προς r ,

$$d\mathbf{p}^T / dr = (1 + rT_q)^{-2} \mathbf{v}^T (\hat{\mathbf{T}} - T_q \mathbf{I}) \quad (23)$$

Πολλαπλασιάζοντας την (23) με \mathbf{e}_j , όπου \mathbf{e}_j διάνυσμα του οποίου η συνιστώσα j ισούται με 1 και όλες οι άλλες ισούνται με μηδέν, έπεται

$$d\mathbf{p}_j / dr > (<) 0 \Leftrightarrow T_j > (<) T_q \quad (24)$$

ή, με λέξεις, ότι μία αύξηση του ποσοστού κέρδους συνεπάγεται την αύξηση (μείωση) των τιμών εκείνων των εμπορευμάτων, των οποίων η ‘μέση περίοδος

⁸ Σημειώνεται ότι $1 + 2\lambda + 3\lambda^2 + 4\lambda^3 + \dots = (1 - \lambda)^{-2}$ (βλ. την αντιστοιχία με την υποσ. 5).

παραγωγής' είναι μεγαλύτερη (μικρότερη) από τη 'μέση περίοδο παραγωγής' του σραφφαϊανού προτύπου εμπορεύματος.⁹

Με το περίφημο αριθμητικό παράδειγμα 'wine-oak', ο Sraffa (1960, § 48) έδειξε ότι η σχέση (14) (και, άρα, η συνθήκη (24)) δεν έχει γενική ισχύ (δηλ. η (24) δεν συνιστά, στη γενική περίπτωση, μία αξιόπιστη προσέγγιση), διότι είναι απολύτως δυνατόν η σχετική τιμή δύο εμπορευμάτων να αποτελεί μία μη μονότονη συνάρτηση του ποσοστού κέρδους. Έτσι συμπέρανε το εξής: 'Η αναγωγή σε όρους χρονολογημένης εργασίας έχει κάποια επίδραση στις προσπάθειες που έγιναν να βρεθεί στην 'περίοδο παραγωγής' ένα ανεξάρτητο μέτρο της ποσότητας του κεφαλαίου που θα μπορούσε να χρησιμοποιηθεί, χωρίς κυκλικό συλλογισμό, για τον προσδιορισμό των τιμών και των μεριδίων της κατανομής. Αλλά η περίπτωση που μόλις εξετάστηκε φαίνεται να δείχνει οριστικά ότι είναι αδύνατο να αθροίσουμε τις 'περιόδους' που αντιστοιχούν στις ποσότητες εργασίας σε ένα απλό (*single*) μέγεθος, το οποίο είναι ανεξάρτητο από την κατανομή του εισοδήματος και τις τιμές των εμπορευμάτων, που θα μπορούσε να θεωρηθεί ότι αντιπροσωπεύει την ποσότητα του κεφαλαίου. Οι αντιστροφές στην κατεύθυνση της κίνησης των σχετικών τιμών, ενώ οι τεχνικές συνθήκες παραγωγής μένουν αμετάβλητες, είναι ασυμβίβαστες με κάθε έννοια του κεφαλαίου ως μετρήσιμης ποσότητας ανεξάρτητης από την κατανομή και τις τιμές.' (*ibid.* p. 38).

Σε αναλυτικούς όρους, η θέση του Sraffa δύναται να αποδοθεί ως εξής: από τις (12) και (18)-(19), προκύπτει

$$w = (R - r)[R(1 + r)]^{-1} \quad (25)$$

ή, εισαγάγοντας την $R = (T_q - 1)^{-1}$ (βλ. σχέση (21)),

$$w = [1 - r(T_q - 1)](1 + r)^{-1} \quad (26)$$

και, παραγωγίζοντας ως προς r ,

$$\dot{w} = -T_q(1 + r)^{-2} \quad (27)$$

⁹ Ο αναγνώστης θα κατανοεί ότι η γενική μορφή της πρότασης είναι: μία αύξηση του ποσοστού κέρδους συνεπάγεται την αύξηση (μείωση) των τιμών εκείνων των εμπορευμάτων, των οποίων η 'μέση περίοδος παραγωγής' είναι μεγαλύτερη (μικρότερη) από τη 'μέση περίοδο παραγωγής' του εμπορεύματος, το οποίο χρησιμοποιείται ως μέτρο των τιμών ή, αλλιώς, *numéraire*.

Περαιτέρω, η (12) γράφεται

$$\mathbf{p}^T = w(1+r)\mathbf{I}^T\mathbf{B}(r)$$

ή εισαγάγοντας την (26),

$$\mathbf{p}^T = [1-r(T_q-1)]\mathbf{I}^T\mathbf{B}(r) \quad (28)$$

όπου $\mathbf{B}(r) \equiv [\mathbf{I} - (1+r)\mathbf{A}]^{-1}$. Πολλαπλασιάζοντας την (28) με \mathbf{e}_j , και παραγωγίζοντας ως προς το ποσοστό κέρδους, λαμβάνουμε¹⁰

$$dp_j/dr = -(T_q-1)\mathbf{I}^T\mathbf{B}(r)\mathbf{e}_j + [1-r(T_q-1)]\mathbf{I}^T\mathbf{B}(r)\mathbf{A}\mathbf{B}(r)\mathbf{e}_j$$

ή, ανακαλώντας την (28),

$$dp_j/dr = -(T_q-1)\mathbf{I}^T\mathbf{B}(r)\mathbf{e}_j + \mathbf{p}^T\mathbf{A}\mathbf{B}(r)\mathbf{e}_j$$

από την οποία και έπεται

$$dp_j/dr > (<)0 \Leftrightarrow T_j(r) > (<)T_q \quad (29)$$

όπου

$$T_j(r) \equiv [(\mathbf{p}^T\mathbf{A}\mathbf{B}(r)\mathbf{e}_j)/(\mathbf{I}^T\mathbf{B}(r)\mathbf{e}_j)] + 1 \quad (30)$$

Διαπιστώνουμε, λοιπόν, ότι η συνθήκη (29) διαφέρει, στη γενική περίπτωση, από τη συνθήκη (24) ή, πράγμα που είναι το ίδιο, οι εν λόγω συνθήκες συμπίπτουν αναγκαστικά για $r=0$. Πράγματι, σε αυτήν την τιμή του ποσοστού κέρδους έχουμε $w=1$, $\mathbf{p} = \mathbf{v}$ (βλ. (26) και (28)), και άρα,

$$T_j(0) = [(\mathbf{v}^T\mathbf{A}\mathbf{B}(0)\mathbf{e}_j)/(\mathbf{v}^T\mathbf{e}_j)] + 1$$

Επειδή $\mathbf{A}\mathbf{B}(0) + \mathbf{I} = \mathbf{B}(0)$, έπεται ότι (βλ. (16) και (17))

$$T_j(0) = (\mathbf{v}^T\mathbf{B}(0)\mathbf{e}_j)/(\mathbf{v}^T\mathbf{e}_j) = (\mathbf{z}^T\mathbf{e}_j)/(\mathbf{v}^T\mathbf{e}_j) = T_j \quad (31)$$

¹⁰ Σημειώνεται ότι $d\mathbf{B}(r)/dr = \mathbf{B}(r)\mathbf{A}\mathbf{B}(r)$.

Συμπεράσματα

Συνοψίζοντας, οι σχέσεις που συγκροτούνται στη βάση της ‘Αυστριακής’ θεωρίας και αφορούν στον προσδιορισμό των τιμών παραγωγής και της μεταβολής των συνεπεία μεταβολής της κατανομής του εισοδήματος δεν έχουν γενική ισχύ και θα πρέπει, στην βάση της κριτικής του Sraffa, να θεωρούνται ξεπερασμένες. Ωστόσο, είναι απολύτως δυνατόν οι εν λόγω σχέσεις να θεωρηθούν ως *προσεγγιστικές* και, επομένως, να διερευνηθεί εμπειρικά η ακρίβειά τους (δεδομένου, μάλιστα, ότι, σύμφωνα με ό,τι γνωρίζουμε, στη βιβλιογραφία δεν υπάρχει κάποια αντίστοιχη μελέτη).

Στα ακόλουθα πραγματευόμαστε το ζήτημα αυτού του εμπειρικού ελέγχου χρησιμοποιώντας στοιχεία από τους πίνακες εισροών-εκροών της Φινλανδικής οικονομίας. Η επιλογή της Φινλανδικής οικονομίας δεν ήταν τυχαία, καθώς αποτελεί μία από τις αναπτυγμένες οικονομίες της Ε.Ε και είναι αρκετό ενδιαφέρον να ερευνήσουμε και να εφαρμόσουμε όσα αναλύσαμε θεωρητικά παραπάνω. Εκτός αυτού, δύο σοβαροί λόγοι για τους οποίους επιλέχθηκε η Φινλανδική οικονομία είναι οι εξής: 1) δεν έχουν ποτέ διερευνηθεί οι τιμές παραγωγής αυτής της οικονομίας και 2) επειδή έχουμε στην διάθεσή μας πίνακες εισροών-εκροών για όλη τη δεκαετία 1995-2004, μπορούμε να μελετήσουμε πίνακες με σχετικά μεγάλη χρονική απόσταση, δηλ. αυτών του 1995 και του 2004, και άρα, πίνακες των οποίων τα στοιχεία εικάζεται ότι θα διαφέρουν αρκετά μεταξύ των (έχει παρατηρηθεί ότι από το ένα έτος στο άλλο, ή για βραχείες χρονικές περιόδους των 2-3 χρόνων, τα στοιχεία των πινάκων εισροών-εκροών μίας οικονομίας δεν διαφέρουν κατά πολύ).

ΜΕΡΟΣ ΔΕΥΤΕΡΟ

Η Εμπειρική Ανάλυση

Εισαγωγή

Στο δεύτερο μέρος της εργασίας παρουσιάζουμε, κατ' αρχάς τα εμπειρικά δεδομένα που χρησιμοποιούμε στους υπολογισμούς. Δηλαδή, την μήτρα εισροών-εκροών, το διάνυσμα της ομοιογενούς εργασίας και το διάνυσμα του πραγματικού ωρομισθίου. Επίσης, δείχνουμε πώς εξάγονται αυτά τα δεδομένα από τα στοιχεία που προσφέρουν οι στατιστικές υπηρεσίες.¹¹ Αναλυτικότερα, βάσει των διαθέσιμων πινάκων εισροών-εκροών της Φινλανδικής οικονομίας για τα έτη 1995 και 2004 μπορούμε να υπολογίσουμε τα εξής:

- 1) Τη μήτρα των τεχνικών συντελεστών \mathbf{A} , το διάνυσμα της άμεσης ομοιογενούς εργασίας l , και το διάνυσμα του πραγματικού ωρομισθίου b .
- 2) Το διάνυσμα των ποσοτήτων άμεσης και έμμεσης εργασίας, \mathbf{v} , και το διάνυσμα, \mathbf{z} (βλ.(15) και (17)). Εν συνεχεία, εκτιμούμε τη διαγώνια μήτρα των 'μέσων περιόδων παραγωγής', $\hat{\mathbf{T}}$, (βλ. (16)).
- 3) Το 'αληθές' διάνυσμα των τιμών παραγωγής \mathbf{p}^T , και το 'αληθές' ενιαίο ποσοστό κέρδους (που αντιστοιχούν στο εκτιμηθέν, από τους εμπειρικούς πίνακες εισροών-εκροών, διάνυσμα του πραγματικού ωρομισθίου). Ακολούθως, θα δούμε το κατά πόσον τα αντίστοιχα 'Αυστριακά' μεγέθη αποτελούν μία καλή προσέγγιση αυτών των 'αληθών' μεγεθών. Επίσης, μέσω του 'd-distance' (το οποίο συνιστά ένα μέτρο απόκλισης ανάμεσα στα δύο μεγέθη) υπολογίζουμε το σχετικό σφάλμα της προσέγγισης για το ποσοστό κέρδους.
- 4) Ελέγχουμε την αξιοπιστία της 'Αυστριακής προσέγγισης', δηλαδή πώς θα μεταβάλλονταν οι τιμές των εμπορευμάτων συνεπεία μίας αύξησης του ποσοστού κέρδους, εάν ίσχυε η 'Αυστριακή' προσέγγιση.
- 5) Ελέγχουμε διαγραμματικά εάν υπάρχει κάποιο εμπόρευμα για το οποίο δεν ισχύει η ακόλουθη 'Αυστριακή' πρόταση: «μία αύξηση του ποσοστού κέρδους συνεπάγεται την αύξηση (μείωση) των τιμών εκείνων των εμπορευμάτων, των οποίων η 'μέση περίοδος παραγωγής' είναι μεγαλύτερη (μικρότερη) από τη 'μέση περίοδο παραγωγής' του σφραφιαϊανού προτύπου εμπορεύματος».

¹¹ Τα στοιχεία που χρησιμοποιήθηκαν για την Φινλανδική οικονομία τα πήραμε από το site της Eurostat <http://ec.europa.eu/eurostat>.

3. Τα Εμπειρικά Δεδομένα

Καταρχάς, θα αναφέρουμε ότι τα εμπειρικά δεδομένα τα συλλέξαμε σε μορφή excel.¹² Οι εμπειρικές μετρήσεις τις οποίες παρουσιάζουμε στο ΠΑΡΑΡΤΗΜΑ ΙΙ, στο τέλος της εργασίας, έγιναν βάση του προγράμματος «Mathematica». Επίσης, όλες οι μήτρες των παραρτημάτων παρουσιάζονται με αρίθμηση των στηλών τους και χωρίς στρογγυλοποιήσεις των στοιχείων τους.

3.1 Παρουσίαση των εμπειρικών δεδομένων

Στην παρακάτω μελέτη μας χρησιμοποιούμε συμμετρικούς πίνακες εισροών-εκροών διαστάσεων 59×59 . Σημειώνουμε ότι στους πίνακες εισροών-εκροών (SIOT) που χρησιμοποιήθηκαν για την Φινλανδία για τα έτη 1995 και 2004, παρατηρήθηκε ότι όλα τα στοιχεία που σχετίζονται με το εμπόρευμα 12 είναι μηδέν και επομένως τα αφαιρούμε από την ανάλυσή μας. Ακόμα, παρατηρούμε ότι όλα τα στοιχεία της στήλης της μήτρας των ενδιάμεσων χρήσεων, Z , που αφορούν στο εμπόρευμα 11 είναι μηδέν, ενώ υπάρχουν θετικά στοιχεία στην γραμμή της μήτρας Z που αφορά στο εμπόρευμα 11. Για αυτό τον λόγο συναθροίζουμε τον κλάδο 11 με τον κλάδο 13. Το εμπόρευμα 11 εισάγεται μόνο, δεν παράγεται από την οικονομία, γι' αυτό τα στοιχεία της στήλης του είναι μηδενικά και άρα η εργασία που αντιστοιχεί στον κλάδο αυτό είναι μηδενική. Για αυτό τον λόγο, τον συναθροίζουμε με έναν ομοειδή κλάδο, τον κλάδο 13. Επομένως, οι πίνακες που θα χρησιμοποιήσουμε τελικά είναι διαστάσεων 57×57 . Τα εμπειρικά δεδομένα στα οποία βασίζονται οι υπολογισμοί μας είναι: η διαστάσεων 57×57 μήτρα των εισροών (\mathbf{A}), το διαστάσεων 1×57 διάνυσμα των εισροών σε άμεση, ομοιογενή εργασία (\mathbf{I}), το διαστάσεων 57×1 διάνυσμα του πραγματικού ωρομισθίου (\mathbf{b}). Τα παραπάνω στοιχεία παρατίθενται στο ΠΑΡΑΡΤΗΜΑ Ι, στο τέλος της εργασίας.

¹² Βλέπε Παράρτημα Ι.

3.2 Εξαγωγή της Μήτρας των Τεχνικών Συντελεστών

Από τους διαθέσιμους πίνακες μπορούμε να υπολογίσουμε τη μήτρα \mathbf{A} των τεχνικών συντελεστών. Ως γνωστόν, «οι τεχνολογικοί ή τεχνικοί συντελεστές καθορίζουν τα ποσά των εισροών που απαιτούνται από τους διάφορους παραγωγικούς τομείς της οικονομίας προκειμένου να παραχθεί ποσότητα μίας χρηματικής μονάδας από το προϊόν υπό εξέταση παραγωγικού τομέα. Συνεπώς οι τεχνολογικοί συντελεστές αντιπροσωπεύουν τη χρησιμοποιούμενη τεχνολογία».¹³ Υποθέτουμε ότι οι τιμές αγοράς κάθε εμπορεύματος ισούται με την μονάδα $P_1 = P_2 = 1$. Δηλαδή, θεωρούμε ως φυσική μονάδα μέτρησης κάθε εμπορεύματος εκείνη την ποσότητά του που πωλείται μία νομισματική μονάδα.

Ας δούμε πως εξάγεται η μήτρα των τεχνικών συντελεστών \mathbf{A} , η οποία συμβολίζεται ως εξής:

$$\mathbf{A} \equiv \begin{pmatrix} a_{11} & \cdots & a_{1j} \\ \vdots & \ddots & \vdots \\ a_{i1} & \cdots & a_{nn} \end{pmatrix}$$

Μέσα σε κάθε αγκύλη¹⁴ της μήτρας των εισροών, \mathbf{A} , εμφανίζονται κατά σειρά, οι γραμμές της μήτρας: Π.χ. ο αριθμός 0.234443 που εμφανίζεται πρώτος για το έτος 1995 αποτελεί το στοιχείο a_{11} της μήτρας \mathbf{A} και δηλώνει την ποσότητα του εμπορεύματος 1 που εισέρχεται στην παραγωγή του κλάδου 1. Το επόμενο στοιχείο, που είναι το 2.55102×10^{-6} , είναι το a_{12} , το οποίο δηλώνει την ποσότητα του εμπορεύματος 1 που εισέρχεται στην παραγωγή του κλάδου 2 κ.ο.κ. . Γενικά, κάθε στοιχείο της μήτρας $\mathbf{A} \equiv [a_{ij}]$ παριστά την ποσότητα του εμπορεύματος i που απαιτείται για την παραγωγή μίας μονάδας του εμπορεύματος j , δηλαδή υποδηλώνει έναν τεχνολογικό συντελεστή. Αυτός είναι ο λόγος που η μήτρα \mathbf{A} ονομάζεται μήτρα τεχνολογικών συντελεστών. Για να υπολογίσουμε κάθε τεχνολογικό συντελεστή «διαιρούμε κάθε στοιχείο του πίνακα εισροών-εκροών με το σύνολο της στήλης στην

¹³ Βλ. Λίβας, (1994, σελ.23 § 3.1)

¹⁴ Βλ. Παράρτημα II στο τέλος της εργασίας.

οποία το υπόψη στοιχείο καταχωρείται».¹⁵ Το σύνολο της στήλης απεικονίζεται από την γραμμή 70 (output at basic prices) του πίνακα εισροών-εκροών.¹⁶ Επομένως, ο συντελεστής a_{11} προκύπτει από τον λόγο X_{11} / X_1 , όπου X_j είναι η ακαθάριστη εκροή εκφρασμένη σε φυσική ποσότητα, και ισούται με 0.234443, ενώ ο συντελεστής a_{21} προκύπτει από τον λόγο X_{21} / X_1 και ισούται με 0.000143568 κ.ο.κ.

3.3 Εξαγωγή του Διανύσματος της Άμεσης, Ομοιογενούς Εργασίας

Από τους πίνακες εισροών-εκροών μπορούμε να υπολογίσουμε το διάνυσμα των εισροών σε άμεση, ομοιογενή εργασία. Όπως γνωρίζουμε, στον πραγματικό κόσμο, η εργασία είναι ανομοιογενής, ή αλλιώς, *ετερογενής*. Αυτό φαίνεται και από το γεγονός ότι στη γραμμή 70 (compensation of employees), όπου δίνονται οι μισθοί των εργαζομένων, ενέχεται ένα μη ενιαίο ονομαστικό ωρομίσθιο.¹⁷ Για να διεξαχθούν οι υπολογισμοί που απαιτούνται, θα πρέπει να μετατρέψουμε την ετερογενή εργασία, που έχουμε ως στατιστικό δεδομένο, σε ομοιογενή και να κατασκευάσουμε ένα διάνυσμα ομοιογενούς εργασίας.

Η μέθοδος που εφαρμόζεται για αυτή την μετατροπή είναι η ίδια με την μέθοδο που ακολουθείται από τους Okishio and Nakatani (1985, pp. 66-7) καθώς επίσης και από τον Ochoa, (1989, p. 428).¹⁸

Το διάνυσμα των μισθών συμβολίζεται ως εξής:

$$[w_1, w_2, \dots, w_{57}] \begin{pmatrix} L_1 & 0 & \dots & 0 \\ 0 & L_2 & \dots & 0 \\ 0 & 0 & \ddots & 0 \\ 0 & 0 & 0 & L_{57} \end{pmatrix}, \text{ όπου } w_j \text{ το ονομαστικό ωρομίσθιο του κλάδου } j,$$

L_j ο αριθμός των εργαζομένων στον κλάδο j , ο οποίος δίνεται από την γραμμή 76 (labour inputs-1000 persons) του πίνακα εισροών-εκροών.¹⁹

¹⁵ Βλ. Λίβας, (1994, σελ.23 § 3.1).

¹⁶ Βλ. Παράρτημα Ι στο τέλος της εργασίας.

¹⁷ Βλ. Παράρτημα Ι στο τέλος της εργασίας.

¹⁸ Για τη θεωρητική δικαιολόγηση της μεθόδου, αλλά και τα όριά της, βλ. Sraffa (1985 [1960], § 10), Kurz and Salvadori (1995, pp, 322-5), και Mariolis (2006).

Θεωρούμε ότι w_1 είναι το ελάχιστο εκ των w . Έτσι μπορεί να γίνει,

$$w_1 \left[1, \frac{w_2}{w_1}, \dots, \frac{w_{57}}{w_1} \right] \begin{pmatrix} L_1 & 0 & \dots & 0 \\ 0 & L_2 & \dots & 0 \\ 0 & 0 & \ddots & 0 \\ 0 & 0 & 0 & L_{57} \end{pmatrix} =$$

$$w_1 \left[L_1, \frac{w_2}{w_1} L_2, \dots, \frac{w_{57}}{w_1} L_{57} \right] =$$

$$w_1 [L_1, L_2^*, \dots, L_{57}^*]$$

$$\text{όπου } L_2^* = \frac{w_2}{w_1} L_2, L_{57}^* = \frac{w_{57}}{w_1} L_{57}.$$

Επομένως, το διάνυσμα l των εισροών σε άμεση ομοιογενή εργασία δίνεται από τον τύπο: $\mathbf{l} = [L_1 / X_1, L_2^* / X_2, L_3^* / X_3, \dots, L_{57}^* / X_{57}]$

όπου τα X_j , για $j = 1, 2, 3, \dots, 57$, δίνονται από την γραμμή 70 (output at basic prices) στον αντίστοιχο πίνακα εισροών-εκροών για κάθε έτος.

Καταλήξαμε λοιπόν, στο διάνυσμα άμεσης ομοιογενούς εργασίας l , το οποίο είναι ένα διάνυσμα γραμμή, διαστάσεων 1×57 .

3.4 Εξαγωγή του Διανύσματος του Πραγματικού Ωρομισθίου

Το διάνυσμα του πραγματικού ωρομισθίου είναι διαστάσεων 57×1 και κάθε στοιχείο του, αναφέρεται, κατά σειρά, στα εμπορεύματα της οικονομίας. Υποθέτουμε ότι η σύνθεση του πραγματικού ωρομισθίου είναι ίση με την τελική κατανάλωση των νοικοκυριών. Δηλαδή, ότι όλα τα νοικοκυριά της χώρας χαρακτηρίζονται από μια ενιαία σύνθεση κατανάλωσης. Επίσης υποθέτουμε ότι η αποταμίευση από μισθούς

¹⁹ Βλ. Παράρτημα Ι στο τέλος της εργασίας.

είναι μηδενική. Έτσι, το διάνυσμα του πραγματικού ωρομισθίου προσδιορίζεται ως εξής:

$$\mathbf{b} = c\mathbf{C} = \left(\frac{w_1}{e^T \mathbf{C}}\right)\mathbf{C} = c \begin{pmatrix} C_1 \\ C_2 \\ C_3 \\ \vdots \end{pmatrix} = \begin{pmatrix} cC_1 \\ cC_2 \\ cC_3 \\ \vdots \end{pmatrix}$$

όπου c το ύψος του πραγματικού ωρομισθίου, C το διάνυσμα της ιδιωτικής κατανάλωσης (για το οποίο υποθέτουμε ότι έχει την ίδια σύνθεση με το πραγματικό ωρομίσθιο) και $e^T C$ είναι η συνολική κατανάλωση σε τιμές αγοράς.

Έτσι προσδιορίζουμε το διάνυσμα του πραγματικού ωρομισθίου, που χρησιμοποιούμε στους υπολογισμούς μας.

3.5 Υπολογισμός των Υπολοίπων Απαιτούμενων Μεγεθών

Σε προηγούμενη ενότητα εξάγαμε την μήτρα A . Δεδομένης της A εκτιμούμε την P-F ιδιοτιμή της, λ , η οποία για κάθε έτος είναι:

ΠΙΝΑΚΑΣ 1. Ιδιοτιμές για τα έτη 1995 και 2004

1995	$\lambda = 0.588716$
2004	$\lambda = 0.607857$

Γνωρίζοντας την ιδιοτιμή, μπορούμε να προσδιορίσουμε το μέγιστο ποσοστό κέρδους, R , του συστήματος για κάθε έτος και στη συνέχεια τη 'μέση περίοδο παραγωγής' T_q , σύμφωνα με το θεωρητικό πλαίσιο (βλ. (21)).

Οπότε έχουμε:

ΠΙΝΑΚΑΣ 2. Μέγιστο ποσοστό κέρδους και μέση περίοδο παραγωγής του προτύπου εμπορεύματος για τα έτη 1995 και 2004

1995	$R = 0.6986119$	$T_q = 2.4314099$
2004	$R = 0.6451238$	$T_q = 2.5500901$

Τώρα πρέπει να εκτιμήσουμε το διάνυσμα των ποσοτήτων άμεσης και έμμεσης εργασίας που απαιτούνται για την παραγωγή των επιμέρους εμπορευμάτων, ή διαφορετικά, το διάνυσμα των ‘εργασιακών αξιών’, \mathbf{v} , καθώς και τη διαγώνια μήτρα, $\hat{\mathbf{Z}}$, η οποία σχηματίζεται από τα στοιχεία του διανύσματος \mathbf{Z} , το οποίο ισούται με το γινόμενο του διανύσματος ‘εργασιακών αξιών’ επί την αντίστροφη του Leontief (βλ. (15) και (17)). Εν συνεχεία, εκτιμούμε τη διαγώνια μήτρα των ‘μέσων περιόδων παραγωγής’, $\hat{\mathbf{T}}$ (βλ. (16))²⁰.

Ακολουθώντας, προσδιορίζουμε το ‘ισχύον ή αληθές’ διάνυσμα των τιμών παραγωγής και το ποσοστό κέρδους.

Καταρχάς, εισάγουμε τη σχέση $w = \mathbf{p}^T \mathbf{b}$ στη (12) και έχουμε

$$\mathbf{p}^T = (1+r)\mathbf{p}^T \mathbf{C} \quad (32)$$

όπου $\mathbf{C} \equiv \mathbf{A} + \mathbf{b}\mathbf{l}^T$. Άρα, συμπεραίνουμε ότι το \mathbf{p}^T ισούται με το αριστερό P-F ιδιοδιάνυσμα της \mathbf{C} , ενώ το $(1+r)^{-1}$ ισούται με την P-F ιδιοτιμή της \mathbf{C} . Προφανώς, αυτά είναι το αληθές διάνυσμα των τιμών παραγωγής και το ‘αληθές’ ενιαίο ποσοστό κέρδους (που αντιστοιχούν στο εκτιμηθέν, από τους εμπειρικούς πίνακες εισροών-εκροών, διάνυσμα του πραγματικού ωρομισθίου, \mathbf{b})

Το ζήτημα είναι, τώρα, να δούμε το κατά πόσον τα αντίστοιχα ‘Αυστριακά’ μεγέθη αποτελούν μία καλή προσέγγιση αυτών των ‘αληθών’ μεγεθών. Τα εν λόγω ‘Αυστριακά’ μεγέθη εκτιμώνται μέσω της (14). Συγκεκριμένα, εισαγάγοντας την $w = (\mathbf{p}^a)^T \mathbf{b}$ στην (14), έχουμε²¹

$$(\mathbf{p}^a)^T = (\mathbf{p}^a)^T \mathbf{b}\mathbf{v}^T (\mathbf{I} + r^a \hat{\mathbf{T}})$$

ή

$$(\mathbf{p}^a)^T = (\mathbf{p}^a)^T \mathbf{b}\mathbf{v}^T + r^a (\mathbf{p}^a)^T \mathbf{b}\mathbf{v}^T \hat{\mathbf{T}}$$

ή

²⁰ Βλ. Παράρτημα II

²¹ Ο υπερδείκτης ‘a’ δηλώνει τις λέξεις ‘approximate’ και, ταυτοχρόνως, ‘Austrian’.

$$(\mathbf{p}^a)^T [\mathbf{I} - \mathbf{b}\mathbf{v}^T] = r^a (\mathbf{p}^a)^T \mathbf{b}\mathbf{v}^T \hat{\mathbf{T}}$$

ή

$$(\mathbf{p}^a)^T = r^a (\mathbf{p}^a)^T \mathbf{b}\mathbf{v}^T \hat{\mathbf{T}} [\mathbf{I} - \mathbf{b}\mathbf{v}^T]^{-1}$$

ή

$$(\mathbf{p}^a)^T = r^a (\mathbf{p}^a)^T \mathbf{D} \quad (33)$$

όπου $\mathbf{D} \equiv \mathbf{b}\mathbf{v}^T \hat{\mathbf{T}} [\mathbf{I} - \mathbf{b}\mathbf{v}^T]^{-1}$.

Από την (33) έπεται ότι το $(\mathbf{p}^a)^T$ ισούται με το αριστερό P-F ιδιοδιάνυσμα της \mathbf{D} , ενώ το $(r^a)^{-1}$ ισούται με την P-F ιδιοτιμή της \mathbf{D} . Τώρα, υπολογίζουμε, πρώτον, την ‘ d distance’ ανάμεσα στα \mathbf{p}^T και $(\mathbf{p}^a)^T$,²² και, δεύτερον, το $|r^a - r|/r$, το οποίο δηλώνει το σχετικό σφάλμα της προσέγγισης για το ποσοστό κέρδους. Τρίτον, εισαγάγουμε την τιμή για το r , την οποία βρήκαμε από την επίλυση του (32), στο (14).

ΠΙΝΑΚΑΣ 3. Ποσοστό κέρδους σε ‘αληθείς’ και Αυστριακές τιμές.

1995	$r = 0.3227531$	$r^a = 0.539116$	$ r^a - r /r = 0.670367$
2004	$r = 0.3250526$	$r^a = 0.562756$	$ r^a - r /r = 0.731277$

Υπολογίζουμε το $\tilde{\mathbf{p}}^a \equiv \mathbf{p}^a / w$, ήτοι

$$\tilde{\mathbf{p}}^{aT} = \mathbf{v}^T (\mathbf{I} + r\hat{\mathbf{T}}) \quad (34)$$

και, εν συνεχεία, την ‘ d distance’ ανάμεσα στα \mathbf{p}^T και $(\tilde{\mathbf{p}}^a)^T$. Τέταρτον, επειδή στην βιβλιογραφία έχει διερευνηθεί εκτενώς το ζήτημα της προσέγγισης των τιμών

²² Ως γνωστόν, η ‘ d distance’ εισήχθη από τους Steedman and Tomkins (1998) και συνιστά ένα μέτρο της απόκλισης ανάμεσα σε δύο διανύσματα, το οποίο είναι ανεξάρτητο από τις φυσικές μονάδες μέτρησης και την εξίσωση τυποποίησης αυτών των διανυσμάτων. Ορίζεται ως

$$d \equiv \sqrt{2(1 - \cos \theta)}$$

όπου θ είναι η Ευκλείδεια γωνία ανάμεσα στα διανύσματα $\mathbf{p}^T (\hat{\mathbf{p}}^a)^{-1}$ και εκείνο το διάνυσμα στήλη, του οποίου όλες οι συνιστώσες ισούνται με 1 (*column summation vector*), ήτοι $\mathbf{e} = [1, 1, \dots, 1]^T$.

παραγωγής από το διάνυσμα των εργασιακών αξιών, \mathbf{v} ,²³ κρίνεται σκόπιμο να υπολογισθεί η ‘*d distance*’ ανάμεσα στα \mathbf{p}^T και \mathbf{v}^T . Έτσι, θα έχουμε μία ένδειξη του κατά πόσον οι εργασιακές αξίες ή οι ‘Αυστριακές’ τιμές συνιστούν την καλύτερη προσέγγιση των ‘αληθών’ τιμών παραγωγής. Τέλος, και για τον ίδιο λόγο, κρίνεται σκόπιμο να υπολογισθούν οι ‘*d distances*’ ανάμεσα στο διάνυσμα των τιμών αγοράς, \mathbf{e}^T , και τα διανύσματα $(\mathbf{p}^a)^T$, $\tilde{\mathbf{p}}^a$ και \mathbf{v}^T .

ΠΙΝΑΚΑΣ 4. Το *d-distance* για τα έτη 1995 και 2004.

<i>d-distance</i>	1995	2004
Τιμές παραγωγής vs Αυστριακές τιμές	$d = 0.0686294$	$d = 0.0702424$
Τιμές παραγωγής vs $(\tilde{\mathbf{p}}^a)^T$	$d = 0.0966851$	$d = 0.0992975$
Εργασιακές αξίες vs Τιμές παραγωγής	$d = 0.187553$	$d = 0.187558$
Αυστριακές Τιμές vs Τιμές αγοράς	$d = 0.224807$	$d = 0.241338$
Τιμές αγοράς vs $(\tilde{\mathbf{p}}^a)^T$	$d = 0.2251$	$d = 0.242396$
Εργασιακές αξίες vs Τιμές αγοράς	$d = 0.255272$	$d = 0.272826$

Παρατηρούμε στον παραπάνω πίνακα πως η απόκλιση των εργασιακών αξιών και τιμών παραγωγής είναι μεγαλύτερη σε σχέση με αυτή των Αυστριακών τιμών και τιμών παραγωγής. Επίσης, η απόκλιση μεταξύ τιμών παραγωγής και εργασιακών αξιών δεν διαφέρει (πρακτικά) ανάμεσα στα δύο έτη, ενώ η απόκλιση μεταξύ τιμών παραγωγής και Αυστριακών τιμών παρουσιάζει διαφορά (καίτοι όχι πολύ μεγάλη).

Όπως έχουμε θεωρήσει, οι τιμές έχουν τυποποιηθεί με το ‘Πρότυπο εμπόρευμα’ του Sraffa. Επομένως, και εφόσον η $\hat{\mathbf{T}}$ και το T_q έχουν ήδη υπολογισθεί, γνωρίζουμε πώς

²³ Για τα πιο πρόσφατα ευρήματα βλ., κυρίως, Shaikh (1998), Tsoulfidis and Maniatis (2002), Zachariah (2006), Tsoulfidis and Mariolis (2007), Mariolis and Tsoulfidis (2008a), (2008b), Mariolis (2010).

θα μεταβάλλονταν οι τιμές των εμπορευμάτων συνεπεία μία αύξησης του ποσοστού κέρδους, εάν ίσχυε η ‘Αυστριακή’ προσέγγιση (βλ. συνθήκη (24)). Το ζήτημα είναι να ελέγξουμε την αξιοπιστία αυτής της *a priori* γνώσης. Ο έλεγχος μπορεί να πραγματοποιηθεί ως εξής: κατασκευάζουμε μέσω του *Mathematica* τις γραφικές παραστάσεις των συναρτήσεων των τιμών συναρτήσει του ποσοστού κέρδους (βλ. (28)) και για $0 \leq r < R^-$, όπου R^- ένας πραγματικός αριθμός ‘ελάχιστα’ μικρότερος του R . Εξετάζοντας, λοιπόν, μία προς μία αυτές τις γραφικές παραστάσεις διαπιστώνουμε για ποια εμπορεύματα (ή/και σε ποια διαστήματα τιμών του ποσοστού κέρδους) η (24) δίνει μια σωστή πρόβλεψη.

Επίσης, από την θεωρητική διερεύνηση (βλ. (29)-(30)-(31)) γνωρίζουμε, ειδικότερα, ότι μία ενδεχόμενη αστοχία της (24) οφείλεται στην απόκλιση του μεγέθους

$$T_j(r) \equiv [(\mathbf{p}^T \mathbf{A} \mathbf{B}(r) \mathbf{e}_j) / (\mathbf{1}^T \mathbf{B}(r) \mathbf{e}_j)] + 1$$

από το μέγεθος T_j . Έτσι, κρίνεται σκόπιμο να γίνει, για κάθε εμπόρευμα $j = 1, 2, \dots, n$, μία γραφική παράσταση, στην οποία θα εμφανίζονται το $T_j(r)$, για $0 \leq r < R^-$, το T_j και το T_q . Εάν, λοιπόν, έχουμε ένα εμπόρευμα j , με $T_j > (<) T_q$, για το οποίο η (24) αστοχεί, τότε η αστοχία θα εμφανίζεται σε εκείνο (ή εκείνα) τα διαστήματα τιμών του r , όπου $T_q > (<) T_j(r)$.

3.6 ΠΑΡΑΘΕΣΗ ΠΙΝΑΚΩΝ

	1995	
$T_j - T_q$	$P(r)$	
$T_1 > T_q$	$0 \leq r \leq 0.54 \nearrow^{24}$	$0.54 < r < 0.6985 \searrow$
$T_2 > T_q$	$0 \leq r < 0.6985 \nearrow$	–
$T_3 > T_q$	$0 \leq r \leq 0.22 \nearrow$	$0.22 < r < 0.6985 \searrow$
$T_4 > T_q$	$0 \leq r < 0.6985 \searrow$	–
$T_5 > T_q$	$0 \leq r < 0.6985 \searrow$	–
$T_6 > T_q$	$0 \leq r < 0.6985 \searrow$	–
$T_7 > T_q$	$0 \leq r \leq 0.61 \nearrow$	$0.61 < r < 0.6985 \searrow$
$T_8 > T_q$	$0 \leq r \leq 0.03 \nearrow$	$0.03 < r < 0.6985 \searrow$
$T_9 > T_q$	$0 \leq r < 0.6985 \searrow$	–
$T_{10} > T_q$	$0 \leq r < 0.6985 \searrow$	–
$T_{11} > T_q$	$0 \leq r < 0.6985 \searrow$	–
$T_{12} > T_q$	$0 \leq r < 0.6985 \searrow$	–
$T_{13} > T_q$	$0 \leq r < 0.35 \nearrow$	$0.35 < r < 0.6985 \searrow$
$T_{14} > T_q$	$0 \leq r < 0.6985 \searrow$	–
$T_{15} > T_q$	$0 \leq r < 0.50 \nearrow$	$0.50 < r < 0.6985 \searrow$

²⁴ Στους πίνακες που ακολουθούν χρησιμοποιούμε τα παραπάνω σύμβολα για να εκφράσουμε την αύξηση ή την μείωση της τιμής κάθε εμπορεύματος.

$T_{16} > T_q$	$0 \leq r < 0.42 \nearrow$	$0.42 < r < 0.6985 \searrow$
$T_{17} < T_q$	$0 \leq r < 0.6985 \searrow$	–
$T_{18} < T_q$	$0 \leq r < 0.6985 \searrow$	–
$T_{19} > T_q$	$0 \leq r < 0.6985 \nearrow$	–
$T_{20} > T_q$	$0 \leq r < 0.6985 \nearrow$	–
$T_{21} > T_q$	$0 \leq r < 0.6985 \nearrow$	–
$T_{22} > T_q$	$0 \leq r < 0.6985 \nearrow$	–
$T_{23} > T_q$	$0 \leq r < 0.6985 \nearrow$	–
$T_{24} > T_q$	$0 \leq r < 0.6985 \nearrow$	–
$T_{25} < T_q$	$0 \leq r < 0.6985 \searrow$	–
$T_{26} < T_q$	$0 \leq r < 0.6985 \searrow$	–
$T_{27} < T_q$	$0 \leq r \leq 0.34 \searrow$	$0.34 < r < 0.6985 \nearrow$
$T_{28} < T_q$	$0 \leq r < 0.6985 \searrow$	–
$T_{29} > T_q$	$0 \leq r < 0.6985 \nearrow$	–
$T_{30} < T_q$	$0 \leq r < 0.6985 \searrow$	–
$T_{31} < T_q$	$0 \leq r < 0.6985 \searrow$	–
$T_{32} < T_q$	$0 \leq r < 0.6985 \searrow$	–
$T_{33} < T_q$	$0 \leq r < 0.6985 \searrow$	–
$T_{34} < T_q$	$0 \leq r < 0.6985 \searrow$	–

$T_{35} < T_q$	$0 \leq r < 0.6985 \searrow$	–
$T_{36} < T_q$	$0 \leq r < 0.6985 \searrow$	–
$T_{37} < T_q$	$0 \leq r < 0.6985 \searrow$	–
$T_{38} < T_q$	$0 \leq r < 0.6985 \searrow$	–
$T_{39} < T_q$	$0 \leq r < 0.6985 \searrow$	–
$T_{40} < T_q$	$0 \leq r < 0.6985 \searrow$	–
$T_{41} < T_q$	$0 \leq r < 0.6985 \searrow$	–
$T_{42} < T_q$	$0 \leq r < 0.6985 \searrow$	–
$T_{43} < T_q$	$0 \leq r < 0.6985 \searrow$	–
$T_{44} < T_q$	$0 \leq r < 0.6985 \searrow$	–
$T_{45} > T_q$	$0 \leq r \leq 0.16 \nearrow$	$0.16 < r < 0.6985 \searrow$
$T_{46} < T_q$	$0 \leq r < 0.6985 \searrow$	–
$T_{47} < T_q$	$0 \leq r < 0.6985 \searrow$	–
$T_{48} < T_q$	$0 \leq r < 0.6985 \searrow$	–
$T_{49} < T_q$	$0 \leq r < 0.6985 \searrow$	–
$T_{50} < T_q$	$0 \leq r < 0.6985 \searrow$	–
$T_{51} < T_q$	$0 \leq r < 0.6985 \searrow$	–
$T_{52} < T_q$	$0 \leq r < 0.6985 \searrow$	–
$T_{53} < T_q$	$0 \leq r < 0.6985 \searrow$	–

$T_{54} < T_q$	$0 \leq r < 0.6985 \searrow$	–
$T_{55} < T_q$	$0 \leq r < 0.6985 \searrow$	–
$T_{56} < T_q$	$0 \leq r < 0.6985 \searrow$	–
$T_{57} < T_q$	$0 \leq r < 0.6985 \searrow$	–

	2004	
$T_j - T_q$	$P(r)$	
$T_1 > T_q$	$0 \leq r \leq 0.35 \nearrow$	$0.35 < r < 0.6450 \searrow$
$T_2 < T_q$	$0 \leq r \leq 0.6450 \searrow$	–
$T_3 < T_q$	$0 \leq r \leq 0.6450 \searrow$	–
$T_4 < T_q$	$0 \leq r \leq 0.6450 \searrow$	–
$T_5 < T_q$	$0 \leq r \leq 0.6450 \searrow$	–
$T_6 > T_q$	$0 \leq r \leq 0.20 \nearrow$	$0.20 < r < 0.6450 \searrow$
$T_7 > T_q$	$0 \leq r \leq 0.34 \nearrow$	$0.34 < r < 0.6450 \searrow$
$T_8 < T_q$	$0 \leq r \leq 0.6450 \searrow$	–
$T_9 < T_q$	$0 \leq r \leq 0.6450 \searrow$	–
$T_{10} < T_q$	$0 \leq r \leq 0.6450 \searrow$	–
$T_{11} < T_q$	$0 \leq r \leq 0.6450 \searrow$	–

$T_{12} < T_q$	$0 \leq r \leq 0.6450 \searrow$	–
$T_{13} > T_q$	$0 \leq r < 0.08 \nearrow$	$0.08 \leq r < 0.6450 \searrow$
$T_{14} < T_q$	$0 \leq r \leq 0.6450 \searrow$	–
$T_{15} > T_q$	$0 \leq r \leq 0.39 \nearrow$	$0.39 < r < 0.6450 \searrow$
$T_{16} > T_q$	$0 \leq r \leq 0.23 \nearrow$	$0.23 < r < 0.6450 \searrow$
$T_{17} < T_q$	$0 \leq r \leq 0.6450 \searrow$	–
$T_{18} < T_q$	$0 \leq r \leq 0.6450 \searrow$	–
$T_{19} > T_q$	$0 \leq r \leq 0.46 \nearrow$	$0.46 < r < 0.6450 \searrow$
$T_{20} < T_q$	$0 \leq r \leq 0.6450 \searrow$	–
$T_{21} > T_q$	$0 \leq r \leq 0.11 \nearrow$	$0.11 < r < 0.6450 \searrow$
$T_{22} > T_q$	$0 \leq r \leq 0.6450 \nearrow$	–
$T_{23} > T_q$	$0 \leq r \leq 0.18 \nearrow$	$0.18 < r < 0.6450 \searrow$
$T_{24} > T_q$	$0 \leq r < 0.02 \nearrow$	$0.02 \leq r < 0.6450 \searrow$
$T_{25} < T_q$	$0 \leq r \leq 0.6450 \searrow$	–
$T_{26} > T_q$	$0 \leq r < 0.23 \nearrow$	$0.23 \leq r < 0.6450 \searrow$
$T_{27} < T_q$	$0 \leq r \leq 0.6450 \searrow$	–
$T_{28} < T_q$	$0 \leq r \leq 0.6450 \searrow$	–
$T_{29} > T_q$	$0 \leq r \leq 0.43 \nearrow$	$0.43 < r < 0.6450 \searrow$
$T_{30} < T_q$	$0 \leq r \leq 0.6450 \searrow$	–

$T_{31} < T_q$	$0 \leq r \leq 0.6450 \searrow$	–
$T_{32} < T_q$	$0 \leq r \leq 0.6450 \searrow$	–
$T_{33} < T_q$	$0 \leq r \leq 0.6450 \searrow$	–
$T_{34} < T_q$	$0 \leq r \leq 0.6450 \searrow$	–
$T_{35} < T_q$	$0 \leq r \leq 0.6450 \searrow$	–
$T_{36} < T_q$	$0 \leq r \leq 0.6450 \searrow$	–
$T_{37} < T_q$	$0 \leq r \leq 0.6450 \searrow$	–
$T_{38} < T_q$	$0 \leq r \leq 0.6450 \searrow$	–
$T_{39} < T_q$	$0 \leq r \leq 0.6450 \searrow$	–
$T_{40} < T_q$	$0 \leq r \leq 0.6450 \searrow$	–
$T_{41} < T_q$	$0 \leq r \leq 0.6450 \searrow$	–
$T_{42} < T_q$	$0 \leq r \leq 0.6450 \searrow$	–
$T_{43} < T_q$	$0 \leq r \leq 0.6450 \searrow$	–
$T_{44} < T_q$	$0 \leq r \leq 0.6450 \searrow$	–
$T_{45} > T_q$	$0 \leq r < 0.07 \nearrow$	$0.07 \leq r < 0.6450 \searrow$
$T_{46} < T_q$	$0 \leq r \leq 0.6450 \searrow$	–
$T_{47} < T_q$	$0 \leq r \leq 0.6450 \searrow$	–
$T_{48} < T_q$	$0 \leq r \leq 0.6450 \searrow$	–
$T_{49} < T_q$	$0 \leq r \leq 0.6450 \searrow$	–

$T_{50} < T_q$	$0 \leq r \leq 0.6450 \searrow$	–
$T_{51} < T_q$	$0 \leq r \leq 0.6450 \searrow$	–
$T_{52} < T_q$	$0 \leq r \leq 0.6450 \searrow$	–
$T_{53} < T_q$	$0 \leq r \leq 0.6450 \searrow$	–
$T_{54} < T_q$	$0 \leq r \leq 0.6450 \searrow$	–
$T_{55} < T_q$	$0 \leq r \leq 0.6450 \searrow$	–
$T_{56} < T_q$	$0 \leq r \leq 0.6450 \searrow$	–
$T_{57} < T_q$	$0 \leq r \leq 0.6450 \searrow$	–

3.7 Σχολιασμός Πινάκων

Όπως αναφέρθηκε παραπάνω, εφόσον γνωρίζουμε την διαγώνια μήτρα των ‘μέσων περιόδων παραγωγής’, \hat{T} , και το T_q τότε, εάν υποθέσουμε ότι ισχύει η ‘Αυστριακή’ προσέγγιση (βλ. (24)), μπορούμε να δούμε πώς μεταβάλλονται οι τιμές των εμπορευμάτων συνεπεία μία αύξησης του ποσοστού κέρδους. Στις γραφικές παραστάσεις²⁵ που κατασκευάσαμε εμφανίζεται η σχέση των τιμών με το ποσοστό κέρδους. Έτσι, παρατηρούμε σε ποια εμπορεύματα η (24) δίνει σωστή πρόβλεψη.

Όμως, για να εξετάσουμε σε ποια εμπορεύματα επαληθεύεται η αρχική μας πρόβλεψη, η οποία αναφέρεται στην ‘Αυστριακή’ θεωρία, κατασκευάζουμε γραφικές παραστάσεις στις οποίες θα εμφανίζονται το $T_j(r)$, το T_j και το T_q . Επομένως, ελέγχουμε για κάθε εμπόρευμα, αν αστοχεί ή όχι η (24), και στην περίπτωση που αστοχεί, βλέπουμε το διάστημα τιμών του r στο οποίο εμφανίζεται η αστοχία αυτή.

Στους παραπάνω πίνακες παραθέτουμε αυτά τα αποτελέσματα για τα έτη 1995 και 2004 που αφορούν την οικονομία της Φινλανδίας.

Η πρώτη στήλη του κάθε πίνακα εμφανίζει την σχέση ανάμεσα στη ‘μέση περίοδο παραγωγής’ του κάθε εμπορεύματος και στη ‘μέση περίοδο παραγωγής’ του σραφφαϊανού προτύπου εμπορεύματος.

Η δεύτερη στήλη του κάθε πίνακα εμφανίζει την μεταβολή στη τιμή του κάθε εμπορεύματος συνεπεία μία αύξησης του ποσοστού κέρδους για το διάστημα $0 \leq r < R^-$.

Η τρίτη στήλη δείχνει σε ποια εμπορεύματα αστοχεί η (24). Δηλαδή στα συγκεκριμένα εμπορεύματα δεν ισχύει η ‘Αυστριακή’ προσέγγιση, αφού παρατηρείται μεταβολή στην μονοτονία της γραφικής τους παράστασης και η τιμή του εμπορεύματος, συνεπεία αύξησης του ποσοστού κέρδους, σε ορισμένο διάστημα αυξάνεται ενώ στο υπόλοιπο διάστημα μειώνεται ή/και το αντίστροφο.

Επομένως στα εμπορεύματα που εμφανίζεται αλλαγή της μονοτονίας υπάρχουν οι εξής περιπτώσεις: 1) αν $T_j > T_q$, τότε στο διάστημα όπου η τιμή του εμπορεύματος αυξάνεται ισχύει η ‘Αυστριακή’ προσέγγιση, ενώ στο διάστημα όπου η τιμή

²⁵ Βλ. Παράρτημα II στο τέλος της παρούσης.

μειώνεται δεν ισχύει η ‘Αυστριακή’ προσέγγιση. 2) αν $T_j < T_q$, τότε στο διάστημα όπου η τιμή του εμπορεύματος μειώνεται ισχύει η ‘Αυστριακή’ προσέγγιση, ενώ στο διάστημα όπου η τιμή αυξάνεται δεν ισχύει η ‘Αυστριακή’ προσέγγιση.

Συγκεκριμένα, και στα δύο έτη παρατηρείται ότι, στα περισσότερα εμπορεύματα η μονοτονία των διαγραμμάτων τιμών-ποσοστού κέρδους δεν αλλάζει καθόλου αλλά και στις περιπτώσεις που αλλάζει αυτό δεν συμβαίνει πάνω από μια φορά.

Βλέπουμε ότι και για τα δύο έτη υπάρχει κοινή αλλαγή μονοτονίας στα εμπορεύματα των παρακάτω κλάδων:

- 1) ο κλάδος με κωδικό 01²⁶: Products of agriculture, hunting and related services
- 2) ο κλάδος με κωδικό 13: Metal ores
- 3) ο κλάδος με κωδικό 19: Leather and leather products
- 4) ο κλάδος με κωδικό 21: Pulp, paper and paper products
- 5) ο κλάδος με κωδικό 22: Printed matter and recorded media
- 6) ο κλάδος με κωδικό 66: Insurance and pension funding services, expert compulsory social security services.

Για παράδειγμα στο κλάδο με κωδικό 01 και για τα δύο έτη, παρατηρούμε πως η τιμή του εμπορεύματος αυξάνεται στο διάστημα τιμών του ποσοστού κέρδους από 0 έως 0.54 ενώ μειώνεται για το διάστημα τιμών του ποσοστού κέρδους από 0.54 έως 0.6985.

Επίσης, παρατηρείται διαφορά ως προς την μεταβολή της τιμής, ανάμεσα στα δύο έτη, στα προϊόντα των κλάδων με κωδικούς:

- 1) κωδ.02: Products of forestry, logging and related services
- 2) κωδ.05: Fish and other fishing products, services incidental of fishing
- 3) κωδ.12: Uranium and thorium ores

²⁶ Οι κωδικοί έχουν δοθεί σύμφωνα με τους πίνακες εισροών-εκροών (SIOT) των ετών 1995 και 2004

- 4) κωδ.14: Other mining and quarrying products
- 5) κωδ.25: Rubber and plastic products
- 6) κωδ.26: Other non-metallic mineral products
- 7) κωδ.27: Basic metals
- 8) κωδ.29: Machinery and equipment n.e.c.
- 9) κωδ.30: Office machinery and computers
- 10) κωδ.32: Radio, television and communication equipment and apparatus
- 11) κωδ.33: Medical, precision and optical instruments, watches and clocks
- 12) κωδ.35: Other transport equipment

Πιο αναλυτικά, στον κλάδο με κωδικό 02 παρατηρούμε πως για το έτος 1995 η τιμή αυξάνεται ενώ για το έτος 2004 μειώνεται.

Στον κλάδο με κωδικό 05 η τιμή για το έτος 1995 αυξάνεται ενώ στη συνέχεια αλλάζει η μονοτονία της καμπύλης και η τιμή μειώνεται, ενώ για το έτος 2004 μειώνεται συνεχώς.

Στον κλάδο με κωδικό 12 η τιμή για το έτος 1995 μειώνεται συνεχώς για όλο το διάστημα τιμών του ποσοστού κέρδους ενώ για το έτος 2004 αυξάνεται και στη συνέχεια μειώνεται.

Στον κλάδο με κωδικό 14 η τιμή για το έτος 1995 αυξάνεται και στη συνέχεια μειώνεται ενώ για το έτος 2004 παρατηρείται μείωση.

Επίσης, στον κλάδο με κωδικό 26 η τιμή για το έτος 1995 παρουσιάζει αύξηση συνεχώς ενώ για το έτος 2004 μείωση συνεχώς.

Στον κλάδο με κωδικό 27 η τιμή για το έτος 1995 αυξάνεται συνέχεια ενώ για το έτος 2004 η τιμή αυξάνεται αρχικά, αλλάζει όμως η μονοτονία και στη συνέχεια μειώνεται.

Ακόμη, στον κλάδο με κωδικό 29 η τιμή για το έτος 1995 αυξάνεται συνεχώς ενώ για το έτος 2004 αυξάνεται για ένα συγκεκριμένο διάστημα ενώ στη συνέχεια έχουμε αλλαγή της μονοτονίας και μείωση της τιμής.

Ομοίως η ίδια κατάσταση ισχύει για τους κωδικούς 30 και 35.

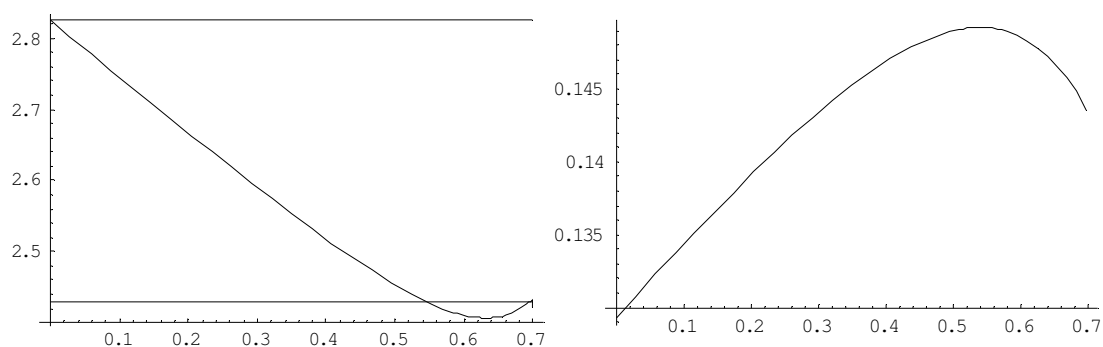
Στον κλάδο με κωδ.32 η τιμή για το έτος 2004 αυξάνεται και στη συνέχεια μειώνεται ενώ για το έτος 1995 η τιμή συνεχώς μειώνεται.

Τέλος, στον κλάδο με κωδ.33 για το έτος 1995 παρατηρούμε πως η τιμή αυξάνεται για ένα συγκεκριμένο διάστημα του ποσοστού κέρδους ενώ στη συνέχεια μειώνεται. Αντίθετα για το έτος 2004 η τιμή του εμπορεύματος μειώνεται συνεχώς.

Για να κατανοήσουμε καλύτερα τα ποιοτικά αποτελέσματα των παραπάνω πινάκων, είναι χρήσιμο να παρουσιάσουμε ενδεικτικά τις γραφικές παραστάσεις τιμών-ποσοστού κέρδους δύο εμπορευμάτων εκ των οποίων στο πρώτο δεν ισχύει η 'Αυστριακή' θεωρία ενώ στο δεύτερο ισχύει. Στα παρακάτω διαγράμματα εμφανίζονται το $T_j(r)$, το T_j και το T_q . Ας δούμε για παράδειγμα για το έτος 1995 τα εμπορεύματα 1 και 2²⁷.

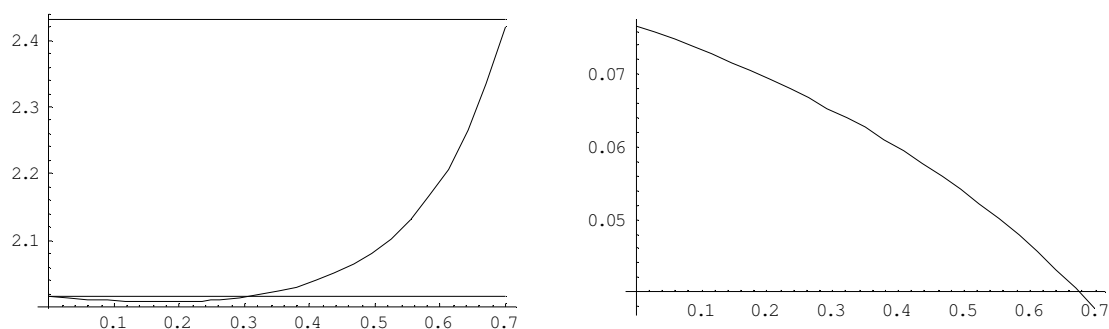
1995

Εμπόρευμα 1



²⁷ Η αρίθμηση των εμπορευμάτων είναι σε αύξοντα αριθμό σύμφωνα με τους πίνακες εισροών-εκροών των αντίστοιχων ετών της Φινλανδικής οικονομίας.

Εμπόρευμα 2



Στο πρώτο διάγραμμα, για το έτος 1995, βλέπουμε πως η καμπύλη $T_j(r)$ στο διάστημα τιμών του r από 0 έως 0.54 είναι μονότονη και εντός του διαστήματος τιμών $T_1 = 2.8244$ και $T_q = 2.4314$, ενώ για το διάστημα τιμών του r από 0.54 έως 0.6985 αλλάζει η μονοτονία της καμπύλης $T_j(r)$ και μάλιστα αφού η ‘Αυστριακή’ θεωρία αστοχεί για το διάστημα όπου $T_j > T_q$, τότε η αστοχία αυτή θα εμφανίζεται σε εκείνο το διάστημα τιμών του r όπου ισχύει $T_j(r) < T_q$. Στο δεύτερο διάγραμμα, για το έτος 1995, παρουσιάζουμε το διάγραμμα των τιμών των εμπορευμάτων για το αντίστοιχο εμπόρευμα, όπου παρατηρούμε πως όσο αυξάνεται το ποσοστό κέρδους αυξάνεται η τιμή του εμπορεύματος, για το διάστημα τιμών του r από 0 έως 0.54 ενώ αλλάζει η μονοτονία του και η τιμή μειώνεται για το διάστημα τιμών του r από 0.54 έως 0.6985.

Στο πρώτο διάγραμμα, για το έτος 2004, παρατηρούμε πως ισχύει η ‘Αυστριακή’ θεωρία αφού η καμπύλη $T_j(r)$ είναι μονότονη σε όλο το διάστημα τιμών από 0 έως 0.6985, δηλαδή δεν υπάρχει αλλαγή στην μονοτονία των τιμών. Στο παράρτημα II της παρούσης παρουσιάζονται για τα δύο έτη 1995 και 2004, όλα τα εμπορεύματα για τα οποία δεν ισχύει η ‘Αυστριακή’ θεωρία. Στο δεύτερο διάγραμμα, για το έτος 2004, παρατηρούμε πως στο διάγραμμα τιμών των εμπορευμάτων η καμπύλη είναι μονότονη, δηλαδή η τιμή αυξάνεται συνέχεια καθώς αυξάνεται το ποσοστό κέρδους σε όλο το διάστημα τιμών του ποσοστού κέρδους.

Συμπερασματικές Παρατηρήσεις

Σύμφωνα με ό,τι γνωρίζουμε, υπάρχει σημαντικός αριθμός εργασιών, οι οποίες ασχολούνται, άμεσα ή έμμεσα, με την εμπειρική διάσταση της ‘εργασιακής θεωρίας της αξίας’, ενώ δεν είναι διαθέσιμη καμιά εργασία εμπειρικού ελέγχου της ‘Αυστριακής’ θεωρίας των τιμών και του κεφαλαίου. Κατά συνέπεια η εκπόνηση μίας σχετικής εργασίας γύρω από την ‘Αυστριακή’ θεωρία έχει ιδιαίτερη σημασία.

Στο πρώτο μέρος της παρούσης εκθέσαμε το θεωρητικό πλαίσιο στο οποίο βασίστηκε η μελέτη μας. Βάσει ενός μονοτομεακού συστήματος, παρουσιάσαμε την έννοια της ‘μέσης περιόδου παραγωγής’ και την σχέση της με την έννοια της ‘έντασης κεφαλαίου’. Η ακρίβεια της προσέγγισης που προκύπτει στη μεταξύ τους σχέση, $k \approx T$, συναρτάται με την ακρίβεια της προσέγγισης $(1+r)^h = 1+hr$, η οποία είναι τόσο μεγαλύτερη όσο μικρότερες είναι οι τιμές του ποσοστού κέρδους και των περιόδων. Στη συνέχεια, γενικεύσαμε την μελέτη μας σε ένα πολυτομεακό σύστημα *à la Sraffa*, όπου προσδιορίσαμε τις σχέσεις στις οποίες βασίζεται ο εμπειρικός έλεγχος της ‘Αυστριακής’ θεωρίας. Δηλαδή, παρουσιάσαμε τη ‘μέση περίοδο παραγωγής’ του σραφφαϊανού προτύπου εμπορεύματος και οδηγηθήκαμε στο εξής συμπέρασμα: μία αύξηση του ποσοστού κέρδους συνεπάγεται την αύξηση (μείωση) των τιμών εκείνων των εμπορευμάτων, των οποίων η ‘μέση περίοδος παραγωγής’ είναι μεγαλύτερη (μικρότερη) από τη ‘μέση περίοδο παραγωγής’ του σραφφαϊανού προτύπου εμπορεύματος. Επίσης, δείξαμε ότι, βάσει της κριτικής του Sraffa, η παραπάνω πρόταση δεν αποτελεί, στην γενική περίπτωση, μία αξιόπιστη προσέγγιση και αυτό οφείλεται στο γεγονός ότι δεν είναι απόλυτα βέβαιο ότι η σχετική τιμή δύο εμπορευμάτων αποτελεί μία μονότονη συνάρτηση του ποσοστού κέρδους. Δηλαδή, είναι πιθανόν οι σχετικές τιμές των εμπορευμάτων να είναι μη μονότονες συναρτήσεις του ποσοστού κέρδους ενώ οι τεχνικές συνθήκες παραγωγής είναι αμετάβλητες. Επομένως, η θέση της ‘Αυστριακής’ θεωρίας δεν έχει γενική ισχύ.

Στη συνέχεια υπολογίσαμε το ‘αληθές’ διάνυσμα των τιμών παραγωγής και το ‘αληθές’ ενιαίο ποσοστό κέρδους και προσπαθήσαμε να ελέγξουμε κατά πόσον τα αντίστοιχα ‘Αυστριακά’ μεγέθη αποτελούν μία καλή προσέγγιση αυτών των ‘αληθών’ μεγεθών.

Υπολογίσαμε, ακόμα, την ‘*d*-distance’ ανάμεσα στα 1) τιμές παραγωγής και ‘Αυστριακές’ τιμές, για να παρατηρήσουμε το σχετικό σφάλμα της προσέγγισης για το ποσοστό κέρδους, 2) τιμές παραγωγής και $(\tilde{p}^a)^T$, 3) τιμές παραγωγής και εργασιακές αξίες, 4) ‘Αυστριακές’ τιμές και τιμές αγοράς, 5) $(\tilde{p}^a)^T$ και τιμές αγοράς, 6) εργασιακές αξίες και τιμές αγοράς.

Από τα αποτελέσματα συμπεραίνουμε ότι οι ‘Αυστριακές’ τιμές προσεγγίζουν με μεγαλύτερη ακρίβεια τις τιμές παραγωγής, σε σχέση με τις εργασιακές αξίες. Για παράδειγμα, το ‘*d*-distance’ για το έτος 1995 μεταξύ τιμών παραγωγής και εργασιακών αξιών έχει τιμή 0.1875 ενώ για το αντίστοιχο έτος το ‘*d*-distance’ μεταξύ τιμών παραγωγής και ‘Αυστριακών’ τιμών είναι 0.0686. Αποδεικνύεται λοιπόν, πως η ‘Αυστριακή’ προσέγγιση είναι αρκετά πιο αξιόπιστη από την εργασιακή θεωρία της αξίας.

Παρατηρήσαμε πως για τα έτη 1995 και 2004 που ελέγξαμε εμπειρικά η ‘Αυστριακή’ θεωρία επαληθεύεται για τα περισσότερα εμπορεύματα. Παρόλα αυτά, υπήρξαν κάποια εμπορεύματα για τα οποία η μονοτονία τους δεν προβλέπεται από την ‘Αυστριακή’ προσέγγιση. Αυτά τα εμπορεύματα είναι για κάθε έτος τα εξής:

1995

- 1) κωδ.05: Fish and other fishing products, services incidental of fishing
- 2) κωδ.14: Other mining and quarrying products
- 3) κωδ.33: Medical, precision and optical instruments, watches and clocks

2004

- 1) κωδ.12: Uranium and thorium ores
- 2) κωδ.27: Basic metals
- 3) κωδ.29: Machinery and equipment n.e.c.
- 4) κωδ.30: Office machinery and computers
- 5) κωδ.32: Radio, television and communication equipment and apparatus
- 6) κωδ.35: Other transport equipment

Επίσης, η ‘Αυστριακή’ θεωρία δεν επαληθεύεται σε κάποια εμπορεύματα στα οποία παρατηρείται μια κοινή αλλαγή της μονοτονίας και στα δύο έτη. Αυτά τα εμπορεύματα είναι τα παρακάτω:

- 7) ο κλάδος με κωδικό 01: Products of agriculture, hunting and related services
- 8) ο κλάδος με κωδικό 13: Metal ores
- 9) ο κλάδος με κωδικό 19: Leather and leather products
- 10) ο κλάδος με κωδικό 21: Pulp, paper and paper products
- 11) ο κλάδος με κωδικό 22: Printed matter and recorded media
- 12) ο κλάδος με κωδικό 66: Insurance and pension funding services, expert compulsory social security services.

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Παρατήρηση

Στους παρακάτω πίνακες εισροών εκροών που αφορούν την Φινλανδική οικονομία για τα έτη 1995 και 2004 , εμφανίζουμε στις γραμμές του κάθε πίνακα τα προϊόντα της οικονομίας και στις στήλες αυτών τους αντίστοιχους κλάδους. Η συνολική παραγωγή που έχουμε στο τέλος (γραμμή 73 - supply at basic prices) ισούται με την αντίστοιχη συνολική ζήτηση (στήλη 75 – total use). Επιπλέον, δίπλα από την αύξουσα αρίθμηση των προϊόντων (κλάδων) είναι καταγεγραμμένοι οι κωδικοί που αναλογούν σε κάθε εμπόρευμα (κλάδο). Αναφερόμαστε σε 57 κλάδους με 57 προϊόντα και θεωρούμε μια οικονομία όπου τα μεγέθη είναι εκφρασμένα σε βασικές τιμές (basic prices).

Επίσης, σημειώνεται πως όλα τα αναλυτικά εμπειρικά αποτελέσματα είναι διαθέσιμα εφόσον ζητηθούν.

ΠΑΡΑΡΤΗΜΑ Ι

I.1 : Μήτρα Τεχνολογικών Συντελεστών έτους 1995

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I.2 : Μήτρα Τεχνολογικών Συντελεστών έτους 2004

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0.00003678857390175286`,0.00014830119375573922`,0.00002482416218452627`,
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0.00002213933341354831`,0.00009855284850705257`,0.00007690324137280964`,
0.00007407407407407407`,0.00010933242506811989`,0.00011778698309066928`,
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0.00009090909090909092`,0.0005`,0.0005926759892997957`,
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0.00111716621253406`,0.0033395225464190985`,0.0026330042313117063`,

I.3 : Διάλυση Άμεσης Ομοιογενούς Εργασίας έτους 1995

{{0.032669983,0.039340458,0.028910719,0.045801585,0.090253613,0.061565597,0.05438228,0.066985104,0.090629055,0.103860149,0.100995824,0.067457616,0.041039474,0.094721814,0.024371101,0.056562158,0.07996924,0.09480273,0.03791514,0.081157924,0.087416457,0.039826316,0.077649363,0.053537269,0.095660155,0.09672376,0.1048589,0.11143689,0.031655408,0.05510124,0.067736004,0.099981548,0.115217198,0.120829671,0.147064033,0.107143567,0.09752271,0.093632844,0.074966925,0.069653273,0.139487706,0.111565929,0.128187321,0.128906041,0.017865409,0.058802658,0.142792552,0.172373641,0.12781094,0.181334779,0.22564301,0.235250396,0.072999246,0.184477922,0.146143126,0.078127092,0.357253886}}

I. 4 : Διάλυση Άμεσης Ομοιογενούς Εργασίας έτους 2004

{{0.022937672,0.026400441,0.02325814,0.03419911,0.051636976,0.031572464,0.037818173,0.094354839,0.062149894,0.067557238,0.064188984,0.036841888,0.031993843,0.061526556,0.007634097,0.031320401,0.055785208,0.052894379,0.020120051,0.061432142,0.049644791,0.039864596,0.049648413,0.029408706,0.061393863,0.048425914,0.069905158,0.060834041,0.017804188,0.026349541,0.046457074,0.059963266,0.07127556,0.060808583,0.089382235,0.070835366,0.067941985,0.05727253,0.036325042,0.043110864,0.047690523,0.072695491,0.058827986,0.048381726,0.011300695,0.035891211,0.099412478,0.142371145,0.096058159,0.109019002,0.148433806,0.141220291,0.044767442,0.11435193,0.084804297,0.048255548,0.230645161}}

I. 5 : Διάνυσμα Πραγματικού Ωρομισθίου έτους 1995

{0.059851476},

{0.00877665},

{0.006841049},

{0.000449473},

{0.0000002},

{0.00005},

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{0.72641258},
{0.001919063},
{0.00102828},
{0.001251455},
{0.011515513},
{0.028625659},
{0.027239547},
{0.125236185},
{0.008361534},

{0.014876765},

{0.075693629},

{0.026446723},

{0.00340725}}

I. 6 : Διάνυσμα Πραγματικού Ωρομισθίου έτους 2004

{{0.058531864},

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{0.005665575},

{0.00016252},

{0.00003},

{0.000176719},

{0.265157268},

{0.001640302},

{0.032610535},

{0.037280668},

{0.014220176},

{0.002594819},

{0.015972189},

{0.072700465},

{0.069600894},

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{0.003180239},
{0.027814911},
{0.008194273},
{0.105434613},
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{0.043193816},
{0.000100226},
{0.050410394},
{0.002130994},
{0.011044183},
{0.125511073},
{0.307056493},
{0.461638231},
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{0.076843782},
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{0.008297632},
{0.001565481},

{0.001997011},
{0.022105209},
{0.05561632},
{0.032126038},
{0.209506078},
{0.009669828},
{0.026438817},
{0.137991277},
{0.044359017},
{0.007516979}}

I. 7 : Διάνυσμα Εργασιακών Αξιών έτους 1995

{{0.12928221279750474`,0.07671847703089775`,0.08126552118996418`,
0.1437203016877893`,0.2175826384837829`,0.16653723425493208`,
0.19063497252078834`,0.19369820059474432`,0.1998890760660021`,
0.21853994385738573`,0.2291382669278285`,0.1532513212922542`,
0.13999003315651998`,0.2027226890998922`,0.19787990356815158`,
0.1670041221197847`,0.18748730547068382`,0.19964317106115284`,
0.17507624244329156`,0.1977875443702431`,0.21882234140233392`,
0.20827856362249011`,0.20414394041544182`,0.18348239288118834`,
0.2096765198575285`,0.23201785834367067`,0.23713952679725947`,
0.20981389960302377`,0.17327588473497724`,0.1270687134753918`,
0.1083928783034657`,0.2118191442639942`,0.19429459271028876`,
0.20515307469439828`,0.20958985366149885`,0.21431755096565794`,
0.1490282198927467`,0.19222307311435075`,0.16875847780426614`,
0.1484104192290621`,0.19479488747527543`,0.15869228081980483`,
0.21443498844376657`,0.2119786660260056`,0.08119709398335671`,
0.12562740082503904`,0.22125090364338731`,0.24947834430352236`,
0.21918162716410292`,0.25382674526066784`,0.27625916056638544`,
0.2796513831598935`,0.14304478241857044`,0.25308904429504553`,
0.2197938568223792`,0.14233953112763326`,0.357253886`}}

I. 8 : Διάνυσημα Εργασιακών Αξιών έτους 2004

{{0.09695672691118053`,0.040854201926291085`,0.057612053722478046`,
0.10487267554732395`,0.11915534871918318`,0.10707988951000184`,
0.12848046175013256`,0.20546716464925488`,0.1350280262246642`,
0.13981398601411266`,0.13977482442141914`,0.09933049116593812`,
0.0987098804898699`,0.12909441480891448`,0.09561595451181472`,
0.10662412695388487`,0.12046556625703746`,0.122197484471221`,
0.11288414902147247`,0.13397305957086555`,0.14061642180379869`,
0.14202452242337213`,0.13230083440280027`,0.10207978877615154`,
0.13866567961617002`,0.146171244647917`,0.15351257180838576`,
0.13233475885286747`,0.10330822986838355`,0.07511680151669174`,
0.08003803314033237`,0.13271089426594931`,0.1188509404407504`,
0.11631730205440016`,0.13238300805187855`,0.13896581993288243`,
0.09604382104849252`,0.10549636937499197`,0.09513722663081704`,
0.09170916219736842`,0.08285763126990571`,0.11351112170332296`,
0.11251879904907265`,0.11566628576476863`,0.050766895424432544`,
0.09417136654842886`,0.1480953070262242`,0.18392910166660248`,
0.14702929279835014`,0.15767261397179824`,0.17813243013241697`,
0.17313196269516673`,0.10152968512667271`,0.15548829397120104`,
0.13803643912752955`,0.09512631181881537`,0.230645161`}}

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0.,
0.,1.`,`}

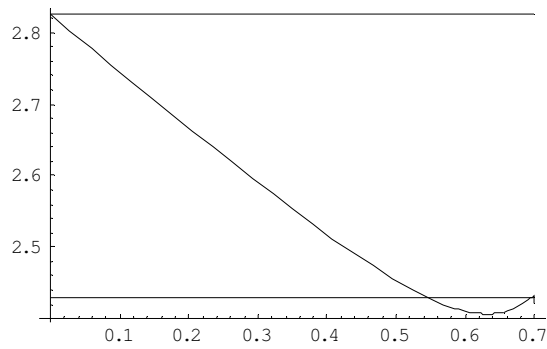
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1.7699517683833768`,0.,0.`},{0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,
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0.,
0.,
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0.,
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ΠΑΡΑΡΤΗΜΑ ΙΙ

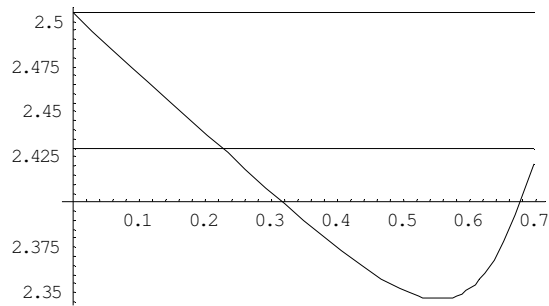
II.1 Γραφικές Παραστάσεις τιμών-ποσοστού κέρδους στις οποίες δεν ισχύει η Αυστριακή θεωρία

1995

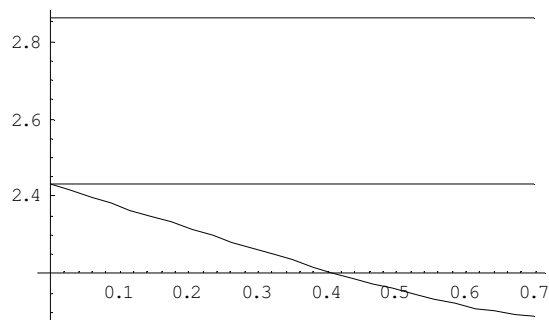
Εμπόρευμα 1²⁸



Εμπόρευμα 3

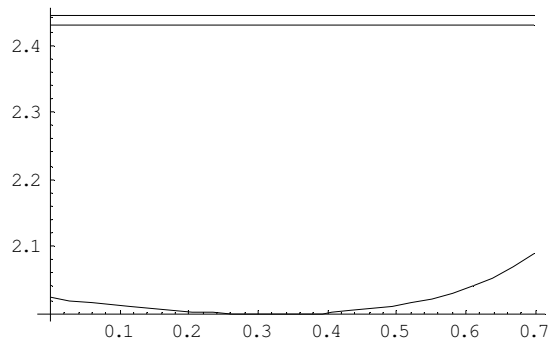


Εμπόρευμα 7

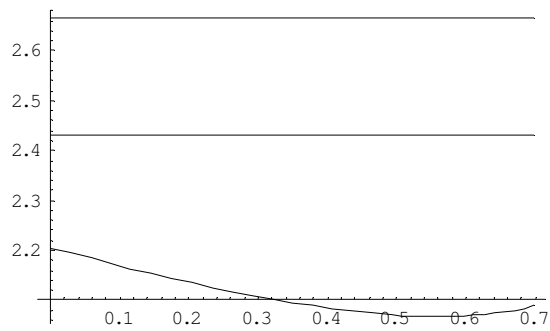


²⁸ Η αρίθμηση των εμπορευμάτων είναι σε αύξοντα αριθμό σύμφωνα με τους πίνακες εισροών-εκροών των αντίστοιχων ετών της Φινλανδικής οικονομίας.

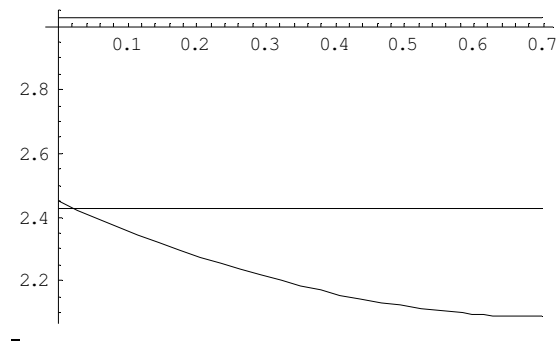
Εμπόρευμα 8



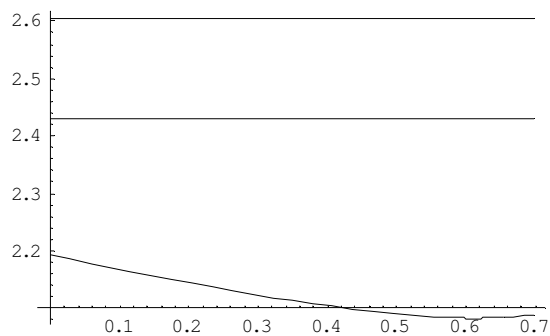
Εμπόρευμα 13



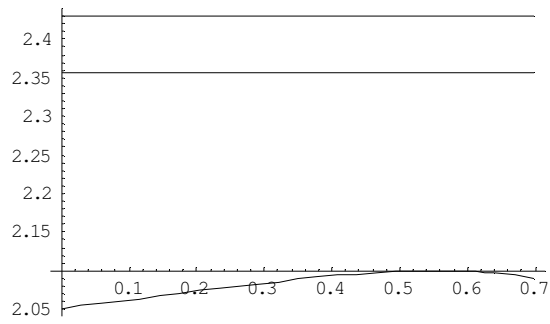
Εμπόρευμα 15



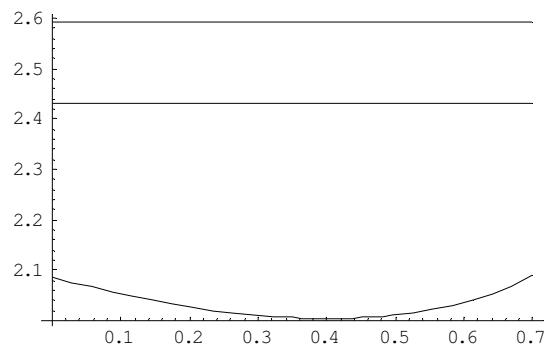
Εμπόρευμα 16



Εμπόρευμα 27

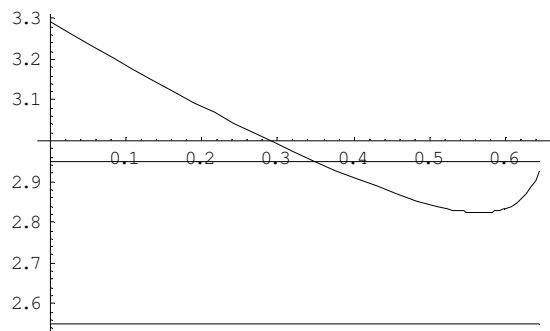


Εμπόρευμα 45

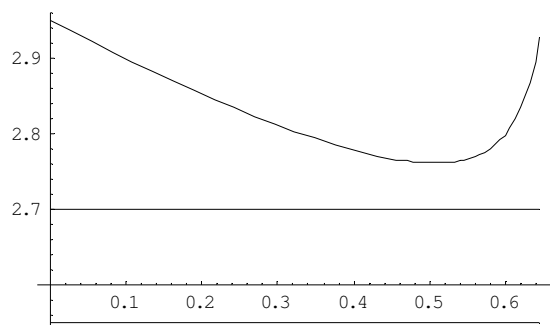


2004

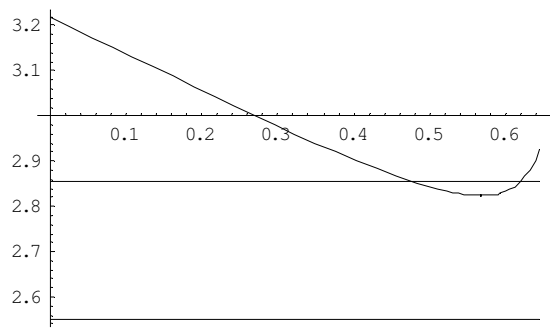
Εμπόρευμα 1



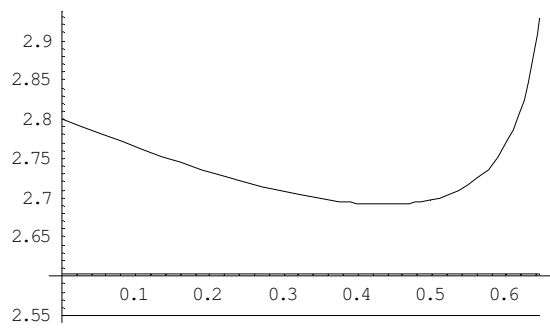
Εμπόρευμα 6



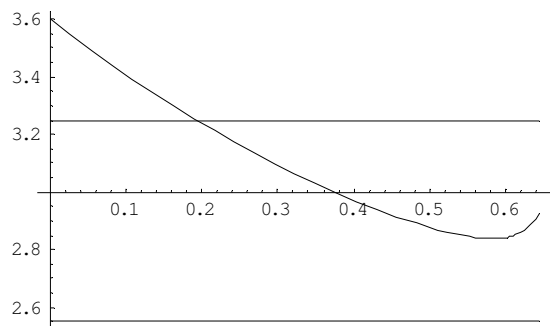
Εμπόρευμα 7



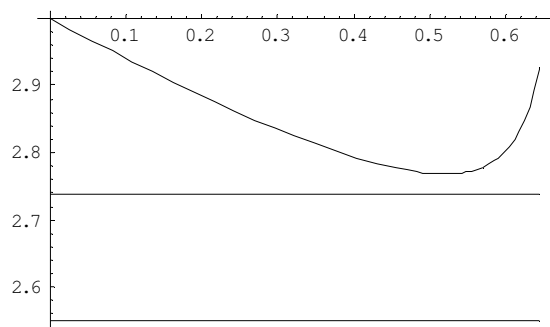
Εμπόρευμα 13



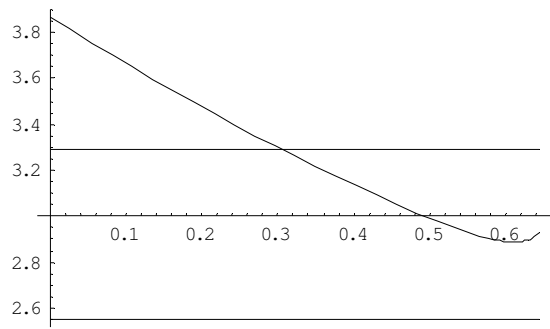
Εμπόρευμα 15



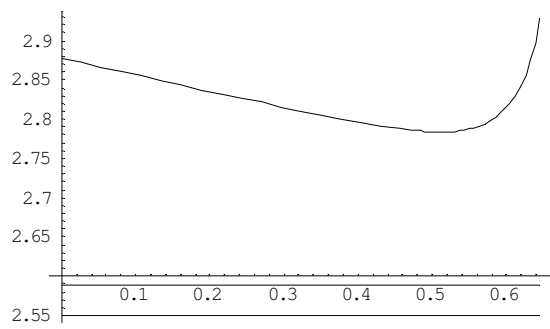
Εμπόρευμα 16



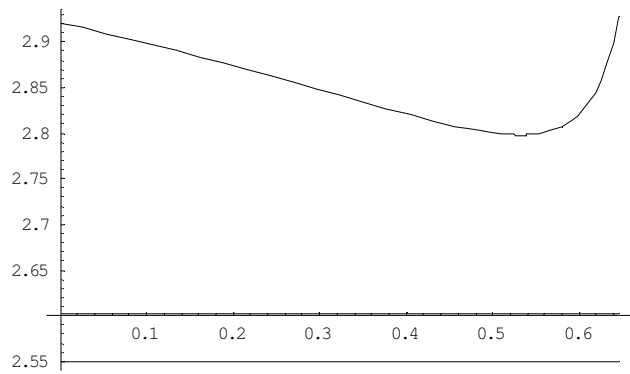
Εμπόρευμα 19



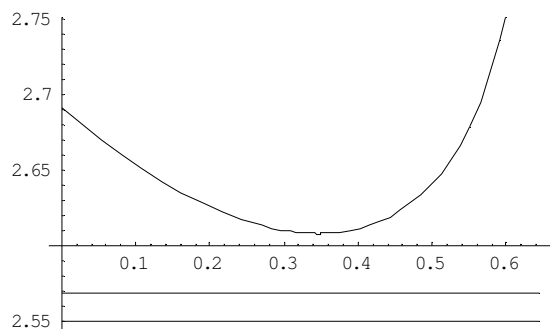
Εμπόρευμα 21



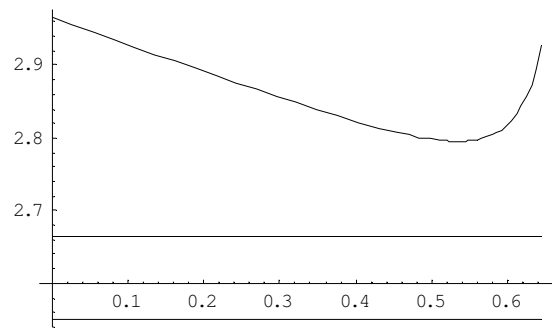
Εμπόρευμα 23



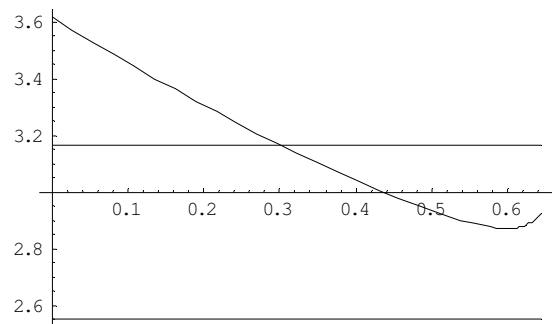
Εμπόρευμα 24



Εμπόρευμα 26



Εμπόρευμα 29



Εμπόρευμα 45

