ΟΙΚΟΝΟΜΙΚΟ ΠΑΝΕΠΙΣΤΗΜΙΟ ΑΘΗΝΩΝ

Τμήμα Λογιστικής και Χρηματοοικονομικής

INVESTOR SENTIMENT as a DETERMINANT of GOVERNMENT BONDS in EUROZONE

ΜΥΡΤΩ-ΧΡΙΣΤΙΝΑ ΚΟΥΤΣΟΠΟΥΛΟΥ

Εργασία υποβληθείσα στο

Τμήμα Λογιστικής & Χρηματοοικονομικής

του Οικονομικού Πανεπιστημίου Αθηνών

ως μέρος των απαιτήσεων για την απόκτηση

Μεταπτυχιακού Διπλώματος Ειδίκευσης

Αθήνα

{Αύγουστος, 2017}

Εγκρίνουμε την εργασία της

Μυρτώς-Χριστίνας Κουτσοπούλου

[ΟΝΟΜΑ ΕΠΙΒΛΕΠΟΝΤΟΣ ΚΑΘΗΓΗΤΗ]	**[ΥΠΟΓΡΑΦΗ]**
Σπύρου Σπύρος	**……**

[ΟΝΟΜΑ ΣΥΝΕΞΕΤΑΣΤΗ ΚΑΘΗΓΗΤΗ]	**[ΥΠΟΓΡΑΦΗ]**
Δράκος Κωνσταντίνος	**……**

[ΟΝΟΜΑ ΣΥΝΕΞΕΤΑΣΤΗ ΚΑΘΗΓΗΤΗ]	**[ΥΠΟΓΡΑΦΗ]**
Τσεκρέκος Ανδριανός	**……**

[31-8-2017]

ΒΕΒΑΙΩΣΗ ΕΚΠΟΝΗΣΗΣ ΔΙΠΛΩΜΑΤΙΚΗΣ ΕΡΓΑΣΙΑΣ

«Δηλώνω υπεύθυνα ότι η συγκεκριμένη πτυχιακή εργασία για τη λήψη του Μεταπτυχιακού Διπλώματος Ειδίκευσης στη Λογιστική και Χρηματοοικονομική έχει συγγραφεί από εμένα προσωπικά και δεν έχει υποβληθεί ούτε έχει εγκριθεί στο πλαίσιο κάποιου άλλου μεταπτυχιακού ή προπτυχιακού τίτλου σπουδών, στην Ελλάδα ή στο εξωτερικό. Η εργασία αυτή έχοντας εκπονηθεί από εμένα, αντιπροσωπεύει τις προσωπικές μου απόψεις επί του θέματος. Οι πηγές στις οποίες ανέτρεξα για την εκπόνηση της συγκεκριμένης διπλωματικής αναφέρονται στο σύνολό τους, δίνοντας πλήρεις αναφορές στους συγγραφείς, συμπεριλαμβανομένων και των πηγών που ενδεχομένως χρησιμοποιήθηκαν από το διαδίκτυο».

[ΟΝΟΜΑΤΕΠΩΝΥΜΟ ΦΟΙΤΗΤΡΙΑΣ] **[ΥΠΟΓΡΑΦΗ]**

Μυρτώ-Χριστίνα Κουτσοπούλου **.....**

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ΠΕΡΙΛΗΨΗ

Η συζήτηση, για το αν η ψυχολογία και το συναίσθημα ενός ατόμου μπορούν να επηρεάσουν τις οικονομικές αποφάσεις, είναι μια συζήτηση που υπάρχει έναν αιώνα στον κλάδο των οικονομικών. Πολλές θεωρίες κατασκευάστηκαν για να αντιμετωπίσουν το θέμα της προτίμησης ή τα κίνητρα που οδηγούν τις αποφάσεις ενός επενδυτή. Ο ισχυρότερος υποψήφιος για μια θεωρία της επένδυσης βασίστηκε στη θεωρία του σύγχρονου χαρτοφυλακίου και στις υπο-θεωρίες που την συμπλήρωσαν, όπως στην υπόθεση της αποδοτικής αγοράς. Το συγκεκριμένο πλαίσιο υποθέτει ότι ο μηχανισμός τιμολόγησης της αγοράς ήταν σε θέση να ενσωματώσει όλες τις πιθανές πληροφορίες στις τιμές των κινητών αξιών, επομένως η αγορά ήταν πάντα σε ισορροπία και τα φαινόμενα όπως το arbitrage δεν ήταν εφαρμόσιμα. Το κύριο πλεονέκτημα που έφερε ένα τέτοιο ερευνητικό πλαίσιο ήταν η πλήρης ενσωμάτωση της Bayesian θεωρίας των πιθανοτήτων και των στατιστικών που βασίστηκαν σε αυτό στο ερευνητικό πλαίσιο της οικονομίας και των οικονομικών. Οι πιθανότητες ήταν ποσοτικοποιήσιμες και μέσω της ανάλυσης της μέσης διακύμανσης, ένας ερευνητής μπορεί να κατασκευάσει ένα βελτιστοποιημένο χαρτοφυλάκιο περιουσιακών στοιχείων.

Η αποδοτική υπόθεση της αγοράς και το σύνολο των χρηματοοικονομικών εργαλείων που διαθέτει η σύγχρονη θεωρία χαρτοφυλακίου έχουν αμφισβητηθεί πολλές φορές. Τα συστήματα και το συναίσθημα των ανθρωπίνων πεποιθήσεων είναι καταλυτικά για όλη τη διαδικασία, επειδή ο άνθρωπος πάντα προσπαθεί να εξορθολογήσει το φαινόμενο του μαύρου κύκνου, δηλαδή το ακραίο γεγονός που μπορεί να αναμένει μόνο αναδρομικά. Η συμπεριφορική έγινε ο κύριος αντισυμβαλλόμενος που άρχισε να παρέχει σταθερή επιχειρηματολογία ενάντια στις θεωρίες του κλασσικού πλαισίου. Το επιχείρημα ήταν ότι ακόμα κι αν υπάρχουν τέλειες, απεριόριστες πληροφορίες, εξακολουθούν να υπάρχουν οι εγγενείς δυνατότητες των ανθρώπων να τις επεξεργάζονται και να έχουν ένα σημαντικό αποτέλεσμα από αυτό.

Για να ελεγχθεί ποια συμπεριφορική οικονομία παρείχε την πειθαρχία της οικονομίας, έγιναν μια σειρά ελεγχόμενων πειραμάτων που προσπαθούσαν να φέρουν περισσότερες πληροφορίες σχετικά με τη διαδικασία λήψης ανθρώπινων αποφάσεων. Τα αποτελέσματα φαίνεται να έρχονται σε αντίθεση με τις κλασσικές θεωρίες και το Bayesian πλαίσιο επειδή φαινόταν ότι κάτω από πραγματικές συνθήκες, οι άνθρωποι

ενεργούν και αντιδρούν διαφορετικά από ό, τι πρότεινε η θεωρία. Η πειθαρχία της οικονομίας της συμπεριφοράς προσπάθησε να δημιουργήσει το δικό της πλαίσιο προτείνοντας γενικές θεωρίες ανθρώπινης συμπεριφοράς και κινήτρων όπως η θεωρία της διπλής διαδικασίας, η οποία υποδηλώνει ότι η ανθρώπινη απόφαση και κίνητρο βασίζονται σε ένα διαχωρισμένο σύστημα. Οι δείκτες εμπιστοσύνης και ευαισθητοποίησης σταδιακά έγιναν ουσιαστικοί από την άποψη ενός υπεύθυνου χάραξης πολιτικής. Αυτό που διαφοροποιεί το ESI από ένα δείκτη Baker-Wurgler είναι το γεγονός ότι το ESI είναι κατασκευασμένο βάσει ερωτηματολογίων και συνεντεύξεων από τους συμμετέχοντες στην αγορά, ενώ το Baker-Wurgler βασίζεται σε χρηματοοικονομικές μεταβλητές που υποτίθεται ότι εκφράζουν το επενδυτικό συναίσθημα. Τα αποτελέσματα από τη χρήση δεικτών όπως παρατηρήθηκε από την ΕΚΤ, ιδίως στον δείκτη ESI και τους δείκτες εμπιστοσύνης, ήταν μη γραμμικά. Φαίνεται ότι κατά τη διάρκεια περιόδων σταθερότητας και γενικά καλής λειτουργίας της οικονομικής δραστηριότητας, οι δείκτες δεν παρουσίαζαν καμία εξηγητική ή προβλέψιμη δύναμη, ενώ κατά το χρόνο που σημειώθηκαν συντριβές ή υπήρχαν μεγάλα αρνητικά μακροοικονομικά φαινόμενα, αυξήθηκε η πρόβλεψη και παρατηρήθηκε η ερμηνευτική ισχύς των δεικτών.

Αν και η ιδέα ότι οι πεποιθήσεις και τα συναισθήματα συνεισφέρουν ως παράγοντας λήψης αποφάσεων, η έρευνα γύρω από το θέμα συνεχίζεται. Ο στόχος παραμένει να απαντηθεί στο ζήτημα της σημασίας του αισθήματος του επενδυτή στη διακύμανση των τιμών των περιουσιακών στοιχείων. Το πρώτο ερώτημα που πρέπει να δοθεί είναι εάν το συναίσθημα του επενδυτή παίζει κάποιο ρόλο ως καθοριστικός παράγοντας για την κίνηση των ομολόγων της Ελλάδας, της Γαλλίας και της Ολλανδίας. Δεύτερον, υπάρχουν ενδείξεις συνοχής μεταξύ του δείκτη συναισθημάτων των επενδυτών και των συγκεκριμένων τύπων ομολόγων που συζητήθηκαν παραπάνω; Τα αποτελέσματα θα είναι κρίσιμα για την απόφαση εάν πρόκειται να χρησιμοποιηθεί ένα μοντέλο VAR ή ένα VEC. Εάν υπάρχει κάποια σχέση μεταξύ των δεικτών συναισθημάτων, γίνεται αμέσως ή αρχικά παρατηρούμε μια αλλαγή στο δείκτη και μετά από κάποιο χρονικό διάστημα, υστερεί σε οικονομετρική γλώσσα, η αλλαγή συμβαίνει; Εάν υπάρχει κάποιος τύπος σχέσης μεταξύ του επενδυτικού κλίματος και των συγκεκριμένων ομολόγων χώρας, η σχέση αυτή εμφανίζεται μόνο σε περιπτώσεις αυξημένου κινδύνου, καθώς η αποστροφή κινδύνου εμφανίζεται ή εμφανίζεται γενικά; Τα αποδεικτικά στοιχεία του πρώτου μπορεί να υποδηλώνουν ότι το συναίσθημα γίνεται πιο προφανές

όταν ο παράγοντας αποκλίνει από τον κίνδυνο. Ακολουθεί η συγκεκριμένη έρευνα. Πρώτον, θα δημιουργηθεί ένας πίνακας συσχέτισης προκειμένου να γίνει μια γενική εικόνα. Ο λόγος για τη χρήση της τεχνικής της στοιχειώδους συσχέτισης είναι ότι είναι μια κοινή τεχνική στις οικονομικές έρευνες που προσπαθούν να συλλάβουν συσχετισμούς μεταξύ των μεταβλητών ενδιαφέροντος, διότι είναι ένας άμεσος τρόπος διερεύνησης της πιθανότητας μιας σχέσης. Στη συνέχεια, θα διεξαχθεί δοκιμή μονάδας ρίζας προκειμένου να ελεγχθεί η πιθανότητα ύπαρξης ρίζας κοινής μονάδας ή ριζών μεμονωμένων μονάδων. Αυτό θα βοηθήσει επίσης, την αξιοπιστία της μήτρας συσχετισμού που θα εξεταστεί. Γενικά, η ύπαρξη μονάδων ρίζας μπορεί να προκαλέσει ψεύτικες συσχετίσεις και έτσι καθιστά το πλέγμα αμφισβητήσιμο. Το επόμενο βήμα θα είναι η διεξαγωγή δοκιμής συνοχής Johansen. Η ύπαρξη της συνένωσης είναι μία από τις υποθέσεις της έρευνας και ταυτόχρονα, είναι αποφασιστικής σημασίας να προσδιοριστεί ένα τέτοιο θέμα προκειμένου να καθοριστεί εάν το μοντέλο από το επόμενο βήμα θα είναι ένα VAR ή ένα VEC. Επιπλέον, η ύπαρξη μονάδων ρίζας και συνοχής θα είναι απόδειξη του ορισμού των φαινομένων συνοχής όπως αναφέρθηκε στην αρχή αυτού του τμήματος. Ως το επόμενο βήμα της μεθοδολογίας, θα χρησιμοποιηθεί το πλαίσιο VAR. Αυτό είναι βασικά το πιο σημαντικό μέρος της έρευνας. Μέσω του πλαισίου VAR θα διεξαχθεί μια εκτεταμένη έρευνα σχετικά με τις μεταβλητές που φαίνεται να δημιουργούν αλλαγές σε άλλες μεταβλητές και θα είναι το πλαίσιο που θα παρέχει μια εκτίμηση της βέλτιστης δομής καθυστερήσεων όσον αφορά τον τρόπο με τον οποίο το αποτέλεσμα κάθε μεταβλητής, Μπορεί να είναι όπως. Η δοκιμή Johannsen θα είναι το κριτήριο για το εάν πρόκειται να χρησιμοποιηθεί ένας VEC και πόσα διανύσματα συνένωση θα έχει. Η εστίαση θα γίνει στην ανάλυση της παλμικής αντίδρασης, η οποία δείχνει πώς μια μεταβλητή μπορεί να συμπεριφέρεται σε μια τυχαία καινοτομία από μια άλλη μεταβλητή. Δείχνει το άμεσο αποτέλεσμα και πώς μπορεί να συμπεριφέρεται η μεταβλητή καθώς περνούν οι περίοδοι. Οι μεταβλητές που πρόκειται να χρησιμοποιηθούν είναι ο δείκτης Baker-Wurgler, ο ελληνικός, ο γαλλικός και ο ολλανδικός δείκτης ομολόγων, ο δείκτης του ΕνΔΤΚ, ο δείκτης MSCI, ο δείκτης ESI και η βιομηχανική παραγωγή κάθε εξεταζόμενης χώρας. Η εξάπλωση θα υπολογιστεί με την αφαίρεση της γερμανικής αποδόσεως των δεκαετών bund από κάθε δεκαετή απόδοση των χωρών ενδιαφέροντος. Ο δείκτης ESI έχει μεταφορτωθεί από τη βάση δεδομένων της Eurostat, η βιομηχανική παραγωγή και οι αποδόσεις των ομολόγων έχουν μεταφορτωθεί από τη βάση δεδομένων FRED St. Louis και το HCPI έχει μεταφορτωθεί από τη βάση δεδομένων της ΕΚΤ. Για κάθε χώρα θα δημιουργηθούν

δύο δείγματα για κάθε χώρα. Τα δείγματα θα είναι ίσου μεγέθους και οι σειρές θα είναι το 2005-2007 και το 2008 έως το 2010. Η διαδικασία οποιουδήποτε δείγματος θα είναι αυτή που εξηγείται κατωτέρω και ο λόγος μιας τέτοιας προσέγγισης είναι η δοκιμή μεταξύ πολλών διαφορετικών δειγμάτων επειδή, «θα είναι αποτελέσματα συμφέροντος», η συχνότητα των αποτελεσμάτων σε διαφορετικά δείγματα τους καθιστά πιο ισχυρούς.

Σε όλες τις περιπτώσεις υπήρχαν ιδιαιτερότητες στα αποτελέσματα των δεδομένων. Ακόμα, υπάρχουν μερικά ενδιαφέροντα σημεία που πρέπει να γίνουν υπέρ των υποθέσεων αυτής της έρευνας. Φαίνεται ότι υπήρχαν ενδείξεις συνύπαρξης σε κάθε περίπτωση που αναλύθηκε, η οποία ήταν μία από τις υποθέσεις αυτής της έρευνας. Δεύτερον, φαίνεται ότι το αίσθημα των επενδυτών διαδραματίζει καθοριστικό ρόλο στην εξάπλωση και στην περίπτωση της Ευρωζώνης, ο δείκτης ESI φαίνεται ικανός να καταγράψει τη διάθεση της αγοράς. Είναι ενδιαφέρον ότι τα αποτελέσματα στις περισσότερες περιπτώσεις φαίνεται να είναι επίμονα καθώς περνούν οι περίοδοι, κάτι που μπορεί να θεωρηθεί ως μακροχρόνια σχέση. Ο δείκτης Würgler δεν είχε αποτέλεσμα όπως αναμενόταν, αλλά αυτό από την άλλη μπορεί να θεωρηθεί θέμα τοπικής κλίμακας έναντι της παγκόσμιας κλίμακας και ότι το ESI έχει σχεδιαστεί για να συλλάβει το συναίσθημα της ομάδας του ευρώ. Φαίνεται ότι το κλίμα των επενδυτών έχει σημασία,καθώς ο χρόνος περνάει. Σε ορισμένες περιπτώσεις υποστηρίζεται ότι υπάρχουν ενδείξεις αδράνειας που χρειάζονται κάποιο χρόνο για να παρατηρηθεί το αποτέλεσμα. Όσον αφορά τη δομή καθυστέρησης, το μικρότερο διάστημα ήταν ένα και τα αποτελέσματα ήταν υπέρ των καθυστερημένων τιμών. Είναι συνηθισμένο στην οικονομία να παρατηρεί την αδράνεια στην αρχή και το αποτέλεσμα μιας αλλαγής να γίνεται σταδιακά αντιληπτό καθώς ο χρόνος περνάει. Έτσι, διαπιστώνεται ότι η υπόθεση υστέρησης δεν μπορεί να απορριφθεί με βάση τα συγκεκριμένα αποτελέσματα. Η υπόθεση της αποστροφής κινδύνου και της ποιότητας των ομολόγων δεν φαίνεται να κατέχει. Ειδικά για την περίπτωση του ESI, δεν ήταν μια συγκεκριμένη χώρα που φάνηκε να επηρεάζεται, αλλά χώρες που είναι διαφορετικές. Από την άλλη πλευρά, υπήρχαν ιδιαιτερότητες από τις απαντήσεις στα βασικά στοιχεία. Σε πολλές περιπτώσεις, όταν η απάντηση στις βασικές αρχές φάνηκε περίεργη, η απάντηση στο συναίσθημα ήταν εύλογη από οικονομική άποψη. Φαίνεται ότι οι μεταβλητές λειτουργούσαν καλύτερα όταν η συζήτηση αφορούσε τα δείγματα εν κρίσει. Οι κρίσεις έκαναν το επενδυτικό συναίσθημα να διαδραματίσει πιο καταλυτικό

ρόλο, ίσως λόγω υπερβολικής αντίδρασης ή λόγω αποστροφής της απώλειας. Οι ιδιαιτερότητες που εμφανίζονται στα δείγματα κατά τη διάρκεια της κρίσης οφείλονται στο γεγονός ότι τα θεμελιώδη στοιχεία κατά τη διάρκεια μεγάλων οικονομικών συντριβών χάνουν την προβλεπτική τους δύναμη. Η κρίση της ευρωζώνης, αν και είχε σημαντικές επιπτώσεις σε συγκεκριμένες χώρες, η πίεση από την εκδήλωση αντανακλάται και στις υπόλοιπες χώρες. Με βάση το γεγονός αυτό, μπορεί να υποστηριχθεί ότι η ιδιαίτερη σχέση με τον πληθωρισμό που μπορεί να παρατηρηθεί βασικά οφείλεται στο γεγονός ότι ο πληθωρισμός κατά τη διάρκεια μιας χρηματοπιστωτικής κρίσης μπορεί να γίνει άσχετο μέτρο. Μια πιο ακριβής επιχειρηματολογία για αυτή τη συμπεριφορά μπορεί να βασιστεί στο γεγονός ότι η Ευρωζώνη αντιμετώπισε πρόβλημα με συνεχή χαμηλό πληθωρισμό. Σε πολλές περιπτώσεις υποστηρίχθηκε ότι η Ευρωζώνη μπορεί να είναι μια άλλη παρόμοια περίπτωση όπως η Ιαπωνία. Τα αποτελέσματα αυτά μπορούν να δικαιολογήσουν τη συμπεριφορά στον πληθωρισμό, διότι όταν ο παρατηρούμενος-αναμενόμενος πληθωρισμός φαίνεται να είναι χαμηλός, η αύξηση του πληθωρισμού μπορεί να εκληφθεί ως ένδειξη της επερχόμενης ανάκαμψης.Το πιο σημαντικό εύρημα που πρέπει να υπογραμμιστεί είναι ότι η απάντηση στην ESI φαίνεται να επαναλαμβάνεται, εκτός από το δείγμα των Κάτω Χωρών πριν από την κρίση, το οποίο αποτελείται από παρεκκλίσεις. Σε πολλές περιπτώσεις κατά τη διάρκεια της ανάλυσης κατά την κρίση, το ESI φαίνεται να γίνεται λιγότερο ταραχώδες, χωρίς διορθώσεις και η σχέση με την εξάπλωση φαίνεται να είναι περισσότερο μακροπρόθεσμη. Η σημασία για ένα τέτοιο αποτέλεσμα είναι ότι μπορεί να θεωρηθεί ως απόδειξη ότι το συναίσθημα επηρεάζει τις διαφορές ή τουλάχιστον ότι το ESI είναι καλά κατασκευασμένο ως δείκτης. Τα αποτελέσματα μπορούν να θεωρηθούν ως μικτά, ειδικά το αποτέλεσμα της Ολλανδίας για την πρώτη περίοδο, υπάρχουν ενδείξεις ότι το συναίσθημα των επενδυτών μπορεί να διαδραματίσει ρόλο καθοριστικού παράγοντα για τα spreads ομολόγων του ομίλου ευρώ που ερευνήθηκαν.

Παρόλο που οι εξεταζόμενες χώρες είναι διαφορετικές, ορισμένα αποτελέσματα μοιάζουν να είναι ίδια και είναι υπέρ της επιρροής που έχει το συναίσθημα στην αγορά. Το σημαντικό για τα αποτελέσματα, ειδικά για την περίπτωση του δείκτη ESI, ήταν ότι πολλοί από αυτούς επαναλαμβάνονται σε διαφορετικά δείγματα. Βεβαίως, απαιτούνται περισσότερες έρευνες για να παρουσιαστούν συγκεκριμένα αποτελέσματα, αλλά εξακολουθεί να υπάρχει αλήθεια σε ό,τι υποστηρίζουν οι συμπεριφοριστές. Οι

περιορισμοί αυτής της έρευνας είναι βασικά λόγω της μεθόδου που χρησιμοποιήθηκε. Το πλαίσιο VAR-VEC αν και ευέλικτο δεν βασίζεται σε καμία θεωρία. Στη συγκεκριμένη περίπτωση αυτό λειτουργούσε ως πλεονέκτημα, επειδή οι θεωρίες συναισθημάτων βρίσκονται σε φάση ανάπτυξης, επομένως η ευελιξία αυτού του πλαισίου βοηθά στην έρευνα. Ένας άλλος περιορισμός ήταν το δείγμα. Προκειμένου να χρησιμοποιηθεί ο δείκτης Baker-Wurgler, το δείγμα περιορίστηκε σε ένα εύρος από το 2005-2010. Αυτό το ζήτημα δημιούργησε προβλήματα με τη δομή καθυστέρησης λόγω της έλλειψης παρατηρήσεων. Φάνηκε ότι μπορεί να είναι καλύτερο να συμπεριληφθούν μεγαλύτερα διαστήματα καθυστέρησης σε ορισμένες περιπτώσεις και λόγω του προβλήματος που είχε το εύρος του δείκτη Baker, αυτό δεν θα μπορούσε να συμβεί. Η δομή καθυστέρησης γενικά είναι προβληματική ως έννοια επειδή δεν υπάρχει κανένα αντικειμενικό κριτήριο για τη βέλτιστη δομή καθυστέρησης (Brooks, 2008). Από την άλλη πλευρά, κάποιες δοκιμές που διεξήχθησαν σε ολόκληρο το δείγμα, πριν από τη σύνταξη αυτής της έρευνας, δεν παρήγαγαν αποτελέσματα σαφούς δομής καθυστέρησης, επομένως εναπόκειται στον ερευνητή να αποφασίσει κάτι που συνήθως συμβαίνει με το VAR δομή. Η παρατήρηση για τη συμπεριφορά των κριτηρίων είναι χρήσιμη με κάποιο τρόπο, αλλά, ωστόσο, δεν είναι μια τέλεια λύση. Τέτοιες έρευνες χρειάζονται μεγαλύτερα ποσά δεδομένων και μπορεί να είναι συνετό να γίνουν σε ευρύτερη κλίμακα. Μπορεί επίσης να είναι καλύτερα μια τέτοια ανάλυση να βασίζεται σε όλες τις χώρες της Ευρωζώνης, αλλά αυτό είναι αδύνατο να συμβεί στο πλαίσιο της συγκεκριμένης έρευνας. Ακόμα καλό είναι ότι κατά την ανάλυση 3 διαφορετικών χωρών, μερικά ενδιαφέροντα αποτελέσματα φάνηκαν να είναι παρόμοια.

Introduction

The debate about whether an individual's psychology and sentiment can influence economic and financial decisions is a debate that exists around 1 century in the discipline of economics (ECB, 2013), from the first proponent of this idea, John Maynard Keynes, stating that animal spirits can affect the business cycle through a causal relationship (Keynes, 1936). From then on, many theories were constructed to address the issue of preference or the motivations that drive the decisions of an investor. The fittest candidate for a theory of investment was based on modern portfolio theory and the sub-theories that complemented it, like the efficient market hypothesis (Elton et al., 2015). The specific framework assumed that the market pricing mechanism was capable of incorporating all possible information inside the securities prices, so the market was always in equilibrium and phenomena like arbitrage were not applicable (Elton et al., 2015).

The main advantage that such a research framework brought was the full incorporation of the Bayesian theory of probability and the statistics that were based on it into the research framework of economics and finance (Elton et al., 2015). Probabilities were quantifiable and, through the mean-variance analysis, a researcher can construct an optimized portfolio of assets (Elton et al., 2015). Further developments came like the Black-Scholes framework for pricing options, based on 7 different assumptions and an assumption about the nature of the probability distribution, became dominant paradigms inside the cycles of economics and finance.

The efficient market hypothesis and the whole spectrum of financial tools that modern portfolio theory has, has been challenged many times through the decades. Stock market crashes like the event of 1987's crash gave incentive to the sceptics to start the discussion once again. Sometimes in terms of epistemology, like the case of Nassim Nicholas Taleb, who came up with concept of the black swan (Taleb, 2004). For Taleb, there were events that cannot be anticipated and at the same time, people are bound to the problem of induction as stated by Bertrand Russel (Taleb, 2004). Human belief systems and sentiment are catalytic to the whole process, because humans always try to rationalize the black swan phenomenon, the extreme event that can anticipated only retrospectively (Taleb, 2004).

Behavioral economics became the main counter party which started to provide solid argumentation against the theories of the classical framework. The main argument wasn't around the imperfect nature of information but the contrary, the argument as constructed by Simmons was that even if there is perfect, unlimited information, still, the inherent capabilities of human beings to process it and get a meaningful result out of it, were limited (the behavioural economics guide, 2014). What behavioral economics provided the discipline of economics was a series of controlled experiments that were trying to bring more information about the human decision-making process (The behavioural economics guide, 2014). The results seem to contradict the classical theories and the Bayesian framework because it seemed that under real circumstances, people act and react differently than what the theory was proposing (the behavioural economics guide, 2014). The main focus that the dominating paradigm was giving on past data in order to extract projections about the future, didn't seem to function well in real conditions as people seemed to overreact in new information without taking into account the past observations and thus, creating feedback loops based on overreactions (Grune-Yanoff, 2007). Also central concepts like self-interest were challenged in favor of altruistic behavior when they were tested in experiments that dealt with situations like the prisoner's dilemma (the behavioural economics guide, 2014).

The discipline of behavioral economics tried to create its own framework by proposing general theories of human behavior and motivation like the dual process theory, which suggests that human decision and motivation is based on split system which is comprised of an impulsive-sentimental part and a control-rational part that both of them are operating simultaneously and in many cases in a competitive manner (Stone, 2012). Although there has been evidence which could imply the existence of such a split system, it is still early for the acceptance of such a theory as a matter of pure empirical fact (Stone, 2012).

One of main subjects that proponents of the behavioral point of view were interested in, was how the investor sentiment contribute in the fluctuations of the stock market and in the development of an assets price in general (Baker, Wurgrel, 2007). What was missing was a constructed variable which would be able to capture the investor's sentiment (Baker, Wurgrel, 2007). One of the first attempts for a comprehensive study of the stock market fluctuations was done by Baker and Wurgler with the use of a sentiment index that was constructed by them (Baker, Wurgrel, 2007).

The specific index although was focused in explaining the stock market behavior, it was considered a wide-market index (Baker, Wurgrel, 2007). The results that came for empirical research with the use of the specific market sentiment index, based on different methodologies in each time, gave results that were suggesting that it may be the case that investor sentiment had explanatory power in the investigation of economic phenomena (Baker, Wurgrel, 2007).

The confidence and sentiment indexes gradually became essential from a point of view of a policy maker. The Commission calculates its own index for the region of the Eurozone, the ESI or European economic sentiment index (the nature of markets, 2017). The specific index is comprised of different components who are on their own right, specific confidence indices from various markets with adjusted weights (the nature of markets, 2017). What differentiates the ESI from an index the Baker-Wurgler, is the fact that the ESI is constructed based on questioners and interviews from market participants while the Baker-Wurgler is based on financial variables that are assumed to express the investor sentiment (the nature of markets, 2017). The results from the use of indices as ECB observed, especially in the ESI and confidence indices, were of a non-linear fashion (ECB, 2013). It seems that during periods of stability and overall good-functioning economic activity, the indices didn't show any explanatory or forecasting power, while during time when crashes were occurred or large-scale negative macroeconomic phenomena were present, a rise in the forecasting and explanatory power of the indices was observed (ECB, 2013).

Although the idea that beliefs and sentiment contribute as a factor of decision making is present in the general discussion, the research around the subject is continuing. The goal remains to answer to the question of the importance of an investor's sentiment in the fluctuation of asset prices.

One research done for the German market, was based on the testing of different sentiment indices and one constructed by the researchers based on transactions in the warrants market (Schmitz et al., 2006). The evidence shown that it may be the case that sentiment contributes into the market fluctuations and the price of stocks but it seemed that such a behavior was observed only during the short-run (Schmitz et al., 2006).

Spyrou, in two different researches, tries to shed some light in the issue of which variables explain the behavior of asset prices (Spyrou, 2013). In the first research, he

took the bond spread and used it as a dependent variable, because the spread isn't determined completely by fundamental variables, and the explanatory variables were various fundamentals and two different sentiment indices, one of them the ESI (Spyrou, 2013). In his research, he came up with evidence that were suggesting that indeed the investor sentiment was acting like an explanatory variable, not only for the current, but also the lagged values of it (Spyrou, 2013).

In another research, a similar attempt was made with the difference that this time the dependent variable was the CDS spread, for the same reason like in the case of the bond spread (Galariotis et al., 2016). The goal in the specific research was basically to investigate potential spillover effects inside the Euro-system (Galariotis et al., 2016). The main breakthrough of the research was again the use of sentiment components into the methodology but also, the econometric model which was a panel VAR model (Galariotis et al., 2016). The results were mixed with respect to the main goal of the research but still, evidence about the importance of the investor sentiment were extracted (Galariotis et al., 2016).

It is worth mentioning that nowadays exists a plethora of researches around the investor's sentiment contribution as an explanatory variable. The interesting part is that through comparison of different researches with different sentiment components, what it seems to appear frequently the same, is the econometric framework that is employed in the research. That is the VAR framework which appears to be a common tool of research in a vast spectrum of researches about the investor sentiment.

The purpose of this research is to investigate the investor sentiment inside the context of the Eurozone bond market. Like previous researches that were conducted, also the specific research will employ the VAR framework in order to investigate how the bond spread responds when changes in specific variables occur. From a generic point of view, the research seems to move in the same path as Spyrou's research, with the difference that the VAR framework in this specific paper will be employed in the form of the simple unrestricted VAR. In this regard it might be said that it is closer to Schmitz et al. paper. Moreover, the use of the standard correlation matrix will be used as a first step in order to extract a general view of the underlying situation. The correlation matrix will be accompanied with a unit root test, in order to provide evidence about how much disputable the correlations may be. The variables to be used are the MSCI index, the bond spread of 3 Eurozone countries, the industrial production

of each country and two different sentiment indices, the ESI and the Baker-Wurgler index. The main goal is to investigate the contribution of the sentiment in the bond spread but also to extract evidence around the lags that may exist in the responses, the potential existence of a cointergrating relationship between the sentiment and the variable of interest or if a specific countries bonds tend to rely more on sentiment in contrast with others. The results will be proved useful in the overall discussion upon the specific matter and also, may indirect conclusions could be drawn, like the level on market integration that a country has and the relationship of it with the overall market sentiment. The more important is that the specific research is based on the sequential analysis of different small samples and the chance to observe similar patterns from sample to sample, may consist evidence that the relationship that may be observed, is robust.

It seems that based on the specific samples, the sentiment plays a role, especially during crises, but this is going to be discussed in the section of the analysis.

Hypotheses

1.1

The first question to be answered, is if the investor's sentiment plays any role as the determinant of the movement of Greece's, France's and Netherland's bonds.

1.2

Secondly, is there are any evidence of cointegration between the investors sentiment index and the specific bond types that were discussed above? The results will be crucial for decision if a VAR model is going to be used or a VEC.

1.3.

If there is some relationship between the sentiment indexes, does it take place immediately or first we observe a change in the index and after some time, lags in econometrical language, the change takes place?

1.4.

If there is any type of relationship between investor sentiment and the specific country bonds, that relationship appears only in cases of increased risk as risk aversion appears or it appears in general? Evidence of the first may suggest that sentiment becomes more obvious when the agent becomes risk averse.

Literature review

The presence of sentiment as guiding force of investment decisions has been as subject of debate for many decades. For the more historical-encyclopaedic part of this research sources from well-known books like John Maynard Keynes "The general theory of employment, interest and money" or some elements from "Modern portfolio theory and investment analysis" are used. This part is mostly made to give a historical background about a dialectic battle that rages on for many decades. As this section progresses, it will become more technical, with main focus upon how sentiment can be capture by econometric methods, the idea of indexing sentiment, ECBS point of view upon the concept of confidence and economic development and also, there will be presentations of official researches which had as subject to answer questions around the influence of investor sentiment upon the financial markets.

1. The era of Keynes

The first time that in economics, the discussion about how human psychology can affect the investing decisions was made, it was by John Maynard Keynes. Keynes, dedicates a whole chapter to start a discussion about how expectations can influence the decisions of an entrepreneur and an investor in general (Keynes, 1936). The discussion starts around the concept of certainty and how an investor may decide about the future transactions (Keynes, 1936). It is interesting that the basic idea, is that the future is completely unknown and as the horizon is extended, the possible information that can be used for a decision to be made, gradually becomes irrelevant. Another point to be stressed is that Keynes during the analysis assumes that the interest rate doesn't affect the behavior (Keynes, 1936). To him, as it seems, the two basic components of investment, was the interest rate which can be called the practical component but also the individuals psychology (Keynes, 1936).

One of the interesting arguments made in the specific chapter, was about the information that exists in the markets (Keynes, 1936). The idea is that because of the introduction of investors inside the markets that are not somehow related with entrepreneurship or in daily economics activity, the quality and the degree of information that can be used meaningfully for investment decisions, has declined sharply. Another interesting point is that the profits that are gained through financial transactions seemed to be of short-run nature and unsustainable (Keynes, 1936). He also understood that there exist indirect events that create seasonal fluctuations around

specific assets, fluctuations that tend to appear for short periods during specific time intervals and it was possible to exploit them to achieve speculative profits (Keynes, 1936).

The discussion becomes interesting when the concept of mass psychology is introduced (Keynes, 1936). Using the terms that behavioral economic are employing, the idea around of mass psychology was basically the idea of overreaction (Keynes, 1936). Keynes describes a situation when the general mood in market changes, producing changes in he returns as a result, but the reasons that produce such a change are basically negligible or events that although, they don't have a direct causal relationship with a specific asset, they can produce beliefs that can affect the returns of this asset (Keynes, 1936). One of the observations that Keynes made in a very accurate way is that even if the criterion for such decisions may be purely psychological, the result was real and permanent from a sociological point of view (Keynes, 1936).

Afterwards, the center of the argumentation becomes the way that the specialized investors are behaving inside the financial markets (Keynes, 1936). It seems, based on the analysis from the book, that although the major belief of the time was that professional investors were making mostly long-run decisions, the truth was that the professionals were just trying to anticipate changes in the short-run horizon to get the portfolio performance they wanted (Keynes, 1936). The basic strategy for an investor is to understand what the crowd is going to believe during the next periods and how this might affect the assets of the investor's interest, something that doesn't agree with the consensus that exists inside the economic discipline (Keynes, 1936). For Keynes, the situation was like a pure game of luck where whoever got glimpse of what the majority was thinking about the future, may had a chance to get quick profits (Keynes, 1936).

The concept of the speculative investor becomes central as the argumentation proceeds (Keynes, 1936). Although the speculators are capable to produce instability due their behavior, they exist and they are part of the market (Keynes, 1936). It is interesting to point that the speculative behavior is fundamentally counter-intuitive. The speculator in average is a person that when a trend seems to last long enough, believes that a change to the opposite direction is an upcoming fact (Keynes, 1936). What the speculators do basically is betting against the observable stock market cycle (Keynes, 1936). It is interesting that such behavior from a logician's point of view, is irrational

and more specifically, it is called “the gamblers fallacy”. Based on such a fact, the market becomes a place where mass optimism or pessimism are the basic driving forces (Keynes, 1936). The term that Keynes introduces in the specific section is “the animal spirits”, and is basically another way the express events that are caused from changes in mass psychology (Keynes, 1936). The cause of such changes cannot be identified easily because in many cases it isn’t exactly based on reason but it is mainly something that happens spontaneously (Keynes, 1936). Keynes may be the first to discuss the concept of spontaneity inside the markets, changes that happen in a rapid manner and they seem to happen for no specific and identifiable reason (Keynes, 1936). The animal spirits seem to be a strong driver for the financial markets performance, at least in the eyes of Keynes (Keynes, 1936).

Two interesting concepts that Keynes develop to discuss two different types of investors were the concept of the bull and the concept of the bear (Keynes, 1936). The bull is the optimistic investor that byes and expects the future to be prosperous (Keynes, 1936). The bear is the pessimist and the sceptic, who sells and has a defensive stance against what the future holds (Keynes, 1936).

The major fear that is reflected in Keynes analysis is how speculative behavior and the animal spirits are capable of exaggerating phenomena like stock market crashes and economic crises (Keynes, 1936). Sentiment becomes also when the discussion goes to the concept of liquidity (Keynes, 1936). The speculative motive, and also, the motive of greed and the precautionary motive, are all examples of factors that affect the decision-making process of a person when the decision to be made is if it’s worth to hold cash or not (Keynes, 1936). The psychological basis around cash holding appears once again when Keynes discusses the drop of demand in times of crises, when people are holding money because the expectations that they had for future have collapsed (Keynes, 2010).

Because investing is part calculation, part hope and part sentiment, the probability that an upcoming crisis may have greater impact because of the role that the sentiment will play, is something the troubles Keynes a lot in his analysis, maybe the first analysis that takes human psychology seriously (Keynes, 1936). Speculation and false beliefs can exaggerate the whole situation to such a degree, that the final outcome, in the case of a crisis a negative outcome, will be much larger as the negative externalities that will come as a spillover (Keynes, 1936). One last thing about Keynes

is that although he wasn't against long-run investments, he seemed to believe that they are more difficult, they need a lot more work to succeed, but in general it was the ethical and the economically right way for someone to invest (Keynes, 1936). Another serious fact that Keynes is presenting with such vivid way, is that what in modern financial language is called arbitrage, is not just an aberration that sometimes can be observed, it's a way of profiteering inside the financial markets (Keynes, 2010).

2. The post Keynesian era

After many attempts to formulate a theory that would explain the market behavior. The idea was that with an adequate theory a set of predictions will follow and so, a set of models capable to explain the market forces. During the decade of the 70's, the dominant paradigm inside the discipline of economics was the efficient market hypothesis, and the models that accompanying it (Elton et al., 2015). The efficient market hypotheses suggest that market prices incorporate all available information and so, the market is always in equilibrium (Elton et al., 2015). One of the most crucial conclusions that can be drawn from the efficient market hypothesis is that speculative behaviour and arbitrage cannot exist (Elton et al., 2015). The market participants act in fundamentally rational way, always searching for new information which results in a market that always changes to sustain its state of equilibrium (Elton et al., 2015). The tools that complement the efficient market hypothesis is the mean-variance portfolio analysis (Elton et al., 2015). It should be mentioned, that the mean variance analysis and the rest of the financial tools that existed in 70's were based on the Bayesian theory of probability, which in summary is the theory that states that the frequency affects the probability of an event. In terms of epistemology, the Bayesian theory is basically applied induction. Therefore, the whole spectrum of techniques that were developed during the period under discussion were accompanied with the problems that arise when inductive decisions are heavily involved.

The most interesting assumption is incorporated in the efficient market hypothesis is the assumption of perfect information (Elton et al., 2015). If such a hypothesis is true, then it is necessary that uncertainty, opacity and situations that can be considered vague, in terms of decision making, don't exist (Elton et al., 2015). Even when refinements of the efficient market hypothesis were made, and behaviours like arbitrage were acknowledged that they exist, still the general consensus was that the combination of speculative behaviour, heavy completion and market forces in general

will still produce in a deterministic fashion an economy which would not have great deviations from the economies that are described and discussed in textbooks (the behavioural economics guide, 2014).

3. The rise of behavioural economics

The challenges for mainstream economics were always there, with events like crises and stock market collapses that the general accepted paradigm could not explain and also not predict. Gradually the discussion started to shift again to the notion that human psychology and sentiment were maybe the factors that determine the human decision-making process. Maybe the most important critique of the standard theory is the theory of bounded rationality (Grune-Yanoff, 2007). In order to set the context for the discussion of bounded rationality, it is important to give a more detailed description of the standard theory of the rational individual

The standard theory suggests that preferences are well-defined for any random individual (Grune-Yanoff, 2007). Therefore, the term rationality is defined as the decision that has the better probability to satisfy this well-defined set of preferences (Grune-Yanoff, 2007). In an indirect manner, it is like the consumer has to take a decision under uncertainty in a situation where the possible outcomes have a well-defined probability (Grune-Yanoff, 2007). This is the rational choice theory that is well accepted in mainstream economics as a paradigm that is capable to describe human behaviour in decision making adequately and based on this paradigm, most of the micro-economics models are built (Grune-Yanoff, 2007).

The challenge for theories like the rational choice theory come from a category of phenomena that are called “bounded rationality phenomena”, this term is used in the sense that every time a phenomenon shows a failure in the axiomatic system that economic theory is built upon, it belongs to the pre discussed category (Grune-Yanoff, 2007). This becomes clearer with the fact that the standard models assume full rationality (Grune-Yanoff, 2007). Therefore, if the general paradigm is assuming full rationality, then any kind of event or phenomenon that suggests any kind of violation of this assumption is bound rationality phenomenon (Grune-Yanoff, 2007).

As it was discussed in the efficient market section, Bayesian theory of probability and calculus are composing the basis of the model-development structure of economics. It was stated that in the Bayesian paradigm, the frequency plays a central

role for the probability estimation, now this is going to be more precise by changing the statement in the way that, the probability of a specific hypothesis has partial dependency on its prior probability (Grune-Yanoff, 2007). Kahneman and Tversky through a series of well-developed experiments showed that the evidence suggest that prior probabilities are significantly undervalued in human decision-making process, therefore, people tend to violate one of the most crucial parts of Bayesian theory consistently (Grune-Yanoff, 2007). Other types of phenomena that describe persistent violation of the general consensus, is the exaggeration based on preference of confirming against disconfirming evidence and the tendency that has been observed in humans to neglect the importance that the size that a sample has (Grune-Yanoff, 2007).

The results that came from various experiments, as it mentioned above, are pushing the discussion in the same path that Herbert Simon did (the behavioural economics guide, 2014). It was Simon that firstly introduced this concept in order to criticize the economic theory (the behavioural economics guide, 2014). The main argument was that the time and the brain power that a human being has for the purpose of problem-solving, is limited (the behavioural economics guide, 2014). Therefore, the solutions that a human being will manage to find are not optimal (the behavioural economics guide, 2014). More seriously, this leads to a refinement of how the term rationality is used inside the discipline of economics (the behavioural economics guide, 2014). Based on the explanation of Simons bounded rationality, the rational economic agent in order overcome the capability limitations that naturally has and for time-saving reasons, will accept rules of thumb to take decisions (the behavioural economics guide, 2014). Therefore, because the models of the standard paradigm aren't capable to incorporate the capability limitations, heuristics are used against them (the behavioural economics guide, 2014). Kahneman and Tversky, which are already mentioned in this section, proved that heuristics that seem to be sensible, tend to lead in systematic errors (the behavioural economics guide, 2014).

The departure from rationality is observed both in the judgements that a human being can have, which is something that has to do with the subjects set of beliefs, but also it can be observed when choices are included (the behavioural economics guide, 2014). Some standard concepts that are heavily used by the behavioural economist are the below:

1. Overconfidence: The overconfidence effect appear whenever an economic agent acts in a manner that shows that the perception that a specific agent has for his/her abilities are greater than the actual abilities that the agent has (behavioural economics, 2017).
2. Anchoring: Anchoring is described, based on behavioural economics, as the exposure that an agent has to a number that has as a result, the specific number to become behaving as a reference point that influences the future judgment of the subject (behavioural economics, 2017).
3. Representativeness: The specific heuristic describes the situation by which a judgement about the class that a specific object belongs is based on the notion of how much the object resembles objects that are known to belong to the specific class (behavioural economics, 2017).
4. Availability: The concept of availability describes the situation when judgments about the probability of an event based on how easy a case about the event, an example or just a simple instance can come to the mind of an economic agent (behavioural economics, 2017).
5. The affect heuristic: The specific heuristic describes the situation when the subject relies on the feelings that have been experienced in relation with a specific stimulus (behavioural economics, 2017).

Prospect theory has done a significant effort to incorporate the observed departure from rationality that the agents are showing (the behavioural economics guide, 2014). Prospect theory tries to create a descriptive framework that investigates how the agents decision are made when uncertainty is present the behavioural economics guide, 2014). Prospect theory incorporates elements of psychology and it has made some interesting changes in terms of model design (the behavioural economics guide, 2014). An important example around the model-design choices that a behavioural economist uses can be shown through the value function (the behavioural economics guide, 2014). Some differences that the function has will be showed below:

1. In order for the concept of adaptation to be included, the value function uses the change in wealth rather than the level of wealth (the behavioural economics guide, 2014).

2. In order for loss aversion to be incorporated, the steepness of the loss function is greater than the steepness of the gain function (the behavioural economics guide, 2014).
3. In order for experimental findings to be reflected, the sensitivity that the loss and the gain function are displaying, is diminishing (the behavioural economics guide, 2014).

Before the end of the specific section and because the topic of this research is revolving around the discipline of economics, it is good to present two though experiments from the discipline of behavioural economics that are using some of the concepts that were described above in real economy conditions.

In the mainstream economic theory, self-interest is basis human behaviour and the main primary motive inside the economic context (the behavioural economics guide, 2014). A result from this axiom is the description around the free rider problem, that it is explained on the basis that a rational economic agent would not contribute to the public wealth, if there are no evidence that such a behaviour will act as a maximizing factor for the self-interested agent's wealth (the behavioural economics guide, 2014). The descriptive statistics are suggesting that in reality, people can act selflessly and can be involved into voluntary activity in quite high percentage (the behavioural economics guide, 2014). Contrary results have been extracted also from controlled experiments (the behavioural economics guide, 2014). The results showed that in reality, people are willing to cooperate both in situations when the prisoners dilemma is present and they don't accept offers that seem to be unfair in games of ultimatum type (the behavioural economics guide, 2014).

Camerer done a research on the behaviour of the taxi drivers in the state of New York (the behavioural economics guide, 2014).In the specific market, a driver in order to use a taxi to work, has to pay an amount of money that is fixed and gives permission to drive the car for twelve hours (the behavioural economics guide, 2014).The decision about how many hours the car will be used is a matter that driver decides (the behavioural economics guide, 2014).After the driver has paid the fee, any revenues that will be made from driving belongs to the driver (the behavioural economics guide, 2014).It may sound reasonable that an optimum strategy for a driver to maximize utility is to drive as much as possible when days seem to be good, from the perspective of earnings, and quit early on days that seem bad (the behavioural economics guide,

2014).The peculiarity in this situation is happening when the drivers will set a specific amount of money as limit, with all the lower amounts to be perceived and treated as a loss (the behavioural economics guide, 2014).The result from such a situation will may be a driver that works for more hours during days that turn out to be bad and do the opposite in days that in the end will turn out to be good (the behavioural economics guide, 2014).The problem with such a result is that it is the opposite of what it is assumed to be rational behaviour (the behavioural economics guide, 2014).

Another example comes from the financial markets, which is also the main topic of this research, and it has to do with the concept of overconfidence. If an investor is overconfident, then it reasonable to assume that he/she won't stop trading in situations when information is missing, on the opposite, the trading activity will take place as normal (the behavioural economics guide, 2014). The specific explanation serves as a very good explanation for an anomaly that is really major and can be observed in the context of the financial markets (the behavioural economics guide, 2014). In summary, if the financial markets were a place where rationality is the dominant factor of behaviour, then there won't be any trading activity to be observed (the behavioural economics guide, 2014). There is a vast amount of trading that takes place daily in the markets, activity that seems to be independent of the existent information (the behavioural economics guide, 2014).

A final example that comes from the behavioural finance literature is based on the observations of Dabora and Froot (1999) and it has to do with the case of Royal Dutch Shell (the behavioural economics guide, 2014). Royal Dutch and shell transport are incorporated as separate entities and this holds for both England and the Netherlands (the behavioural economics guide, 2014). The primary location that Shell trades is mainly London and the primary trade location for Royal Dutch petroleum are the Netherlands and the US (the behavioural economics guide, 2014). Royal Dutch shell came to being as an economic entity from the merge of interests, in the basis 60:40, between Shell transport and Royal Dutch petroleum (the behavioural economics guide, 2014). According to the mainstream theory, if the according adjustments around the exchange rates are made, the only ratio that the shares of the two components under discussion should trade, is a ratio of 60:40 (the behavioural economics guide, 2014). The results show that this wasn't the case, and observed deviations from the optimum ratio were in specific instances near 35%, this made the argumentation about taxes and

transaction costs incapable of defending the standard theory (the behavioural economics guide, 2014). This example proves that in reality, prices can have deviations from what it is usually called the intrinsic value and in the specific example, the case of Shell is basically the observation of the violation of fundamental law of economics, the law of one price (the behavioural economics guide, 2014).

One of the earliest researches around the tendency that economic agents are showing towards overreaction when new information is presented, was made by De Bondt and Thaler in the year 1985 (the behavioural economics guide, 2014). Based on the experiments that was discussed above and proves the violation of the Bayesian incorporation of the prior knowledge into decision making, Bondt and Thaler made the hypothesis that if investors have such a behaviour, then the stocks that will start to rise will eventually end up with a price that is really high in order to be justified (the behavioural economics guide, 2014). This would be because the investors will tend to overreact in the new information without taking in to account, or not taking into account so serious, the prior information (the behavioural economics guide, 2014). Also the stocks that show poor performance will end up with too low prices (the behavioural economics guide, 2014). This leads to the prediction that the past high performance stocks will end up underperforming and the reverse will hold for the past underperforming stocks (the behavioural economics guide, 2014). The results came to be in favour of the prediction made by Bondt and Thaler. Under real circumstances, the past high-performance shares end up underperforming and the opposite happened for the past underperforming shares (the behavioural economics guide, 2014).

4. The dual process of rationality in financial thought

Another theory that was developed in order to give a clearer picture about the decision-making processes is the dual process theory (Stone, 2012). The dual process theory, as expressed inside the discipline of finance, is based on the idea that human decision making can be split into two processing systems (Stone, 2012). These two systems in general, operate simultaneously and in a way that can be considered parallel (Stone, 2012). The degree of the internal consistency that the person under investigation has cultivated during the years is the determining factor about if these two systems will function cooperatively or if they will function competitive to each other. The two systems are different in nature with the first being of a reflexive nature and the second to be reflective (Stone, 2012). The reflexive system is characterized with properties like

passion, response to affection, materialism, hedonism and actual objects in contrast with the reflective system that is characterized by the properties of control, abstraction, analytical skill, and reasoning (Stone, 2012).

Evidence from researches conducted from behavioral economists may suggest that the use of a dual-processing framework in order to extract answers for the financial behavior of an individual, may be appropriate (Stone, 2012). Lowenstein and small (2009), proposed a framework for the description of helping behavior that is based on a processing system that is immature but sympathetic and helping in nature and a system that is organized and mature but unhelping and non-sympathetic in nature (Stone, 2012). In 2006, Lea and Webley argued about the way that money is affecting the human behavior (Stone, 2012). In their argumentation, one way that money can influence human through a rational path, the term rational path is used to describe a motivation to obtain money that is based on the need of food, social relations, preproduction and the need for a shelter (Stone, 2012). The other path that is described, usually called the drug path or motivation, is based on reflection and this type of motivation path can give money an addictive property that it can potentially can lead to dysfunctional outcomes (Stone, 2012). The term "drug" that is used in the description of this specific motivation, is based on the notion, that decisions of this kind are stimulating the neurons in the same manner like when under the influence of a psychoactive drug (Stone, 2012).

Empirical evidence are showing the possible dual nature of financial decisions (Stone, 2012). Stone and Ziebart (1995), showed that rewarding a person financial creates to different effects, the first one which is the reflexive is negative and nature and second effect that is based on reflection that was positive and it helped the person in the improvising of its next financial decision's (Stone, 2012). Stone, Bryant and Wier (2010) came up with evidence that the financial well-being of an individual is of a dual nature (Stone, 2012). To specify the results, it was shown that hedonic utility may be positively influenced through financial altruism, which may be considered the financial motivation that is based in creating human relationships, and at the same time there were evidence that shown a negative influence from the side of financial materialism, the motivation that is based on prestige and power.

5. The idea of a sentiment index

In terms of theory a small historical background was given, but in finance and economics what really matters at the end of the day is what the empirical methods have to say. Theories have to fetch quantitative results in order to be evaluated. Based on this fact a question has to be made: What the behavioural theory has done till now in order to justify itself empirically? Of course, lots of controlled experiments have been done but in the strict, econometrical sense what exactly has been done? The answer lies in the concept of the sentiment index or sentiment indicator.

The sentiment indicator is a constructed index, like all indexes, that tries to capture the tendency that exists in the market and use it to do predictions (Baker, Wurgrel, 2007). By using the word sentiment, we accept that there exist expectations and pricings that cannot be evaluated based on reason (Baker, Wurgrel, 2007). The difference and what makes a sentiment indicator a very interesting subject econometrically speaking is that it is constructed via top down method which is something that is purely macro economical and completely opposite to previous bottom up attempts that were using biases and other concepts to do a behavioural finance or economics research (Baker, Wurgrel, 2007).

The specific investor sentiment was constructed after an analysis around the possible components that such an index may incorporate. The final product was an index that was constructed based on 6 specific proxies, these are:

1. The trading volume: The basic argument that this component was used was that it may be a solid sentiment indicator by itself if someone will take into account the standard behaviour that an irrational investor may have (Baker, Wurgrel, 2007). The basic idea is that if the irrational agent has a good sentiment he/she is going to invest more heavily, taking more risks and being more bullish in general than when the investing mood goes down (Baker, Wurgrel, 2007).
2. Dividend premiums: Economically speaking this is straightforward inverse relationship (Baker, Wurgrel, 2007). Based on the researchers such an approach is very good on explaining specific historical trend (Baker, Wurgrel, 2007).
3. Closed end Fund discount: This component is based on a specific type of fund which is known in holding a fixed number of shares (Baker, Wurgrel, 2007). The argument of such a selection from the side of the index creators is that under

specific circumstances it is observed this specific type of funds seem to be over held by retail investors, who are perceived to be more sentimental and so it can act pretty well as an investment index (Baker, Wurgrel, 2007).

4. The IPO volume: The basic reasoning around such a selection as it seems is that there is an assumption that investor sentiment tends to correlate very good with first public offerings and there is a sharp rise in the demand of such offerings when there exists an overall good mood in the market (Baker, Wurgrel, 2007).
5. The IPO first day returns: The rationale behind is almost exactly as in the above case. The difference is that the returns of the first are linked to an investor reaction that is purely based on enthusiasm (Baker, Wurgrel, 2007).
6. The equity issues over new issues: The reason for this selection from the researcher's standpoint is that based on previous findings the specific component shows a high equity proportion during a stagnating market and the reverse in the opposite situation (Baker, Wurgrel, 2007). It's basically a tool of monitoring how the financing activity based on equity and other debt instruments fluctuates in the market (Baker, Wurgrel, 2007).

Based on these components and through such type of argumentation Baker and Wurgrel created an investor sentiment index that is basically the most known in the behavioural finance and economics school of though. Now it's time to discuss the problems that arise when someone tries to create and use such an index.

6. The ESI sentiment index

The European economic sentiment indicator be longs to the category of the composite indicators, the baker Wurgler index, but the weights that are used as components are different (thenatureofmarkets, 2017). The ESI index is composed based on 5 different indices that are:

1. The industrial confidence index (thenatureofmarkets, 2017).
2. The consumer confidence index (thenatureofmarkets, 2017).
3. The retail trade index (thenatureofmarkets, 2017).
4. The construction confidence index (thenatureofmarkets, 2017).
5. The consumer confidence index (thenatureofmarkets, 2017).

The index is calculated by a specialize division of the commission on a monthly basis, like the other sentiment indices (thenatureofmarkets, 2017). The data used for the construction of the index are basically survey data and the major attribute that in general the index has, is that it can give a good estimation about the future development (thenatureofmarkets, 2017).

Every component inside the ESI index has its specific explicit weight and the final allocation is 40% for industry, 5% for construction, 30% for services, 20% for consumers and 5 % for retail trade (thenatureofmarkets, 2017). The criteria for the components of the ESI index were two, the first has to do with the representation that the index has to the market which sentiment tries to capture, the second was the relationship with developmental economic aggregates like GDP (thenatureofmarkets, 2017). The flow of data that help in the construction of ESI's components is coming from interviews and questioners on the market participants (thenatureofmarkets, 2017).

From an investors point of view the index is constructed in order to provide an insight around how the business activity might evolve during the future periods (thenatureofmarkets, 2017). It is a quite accurate measure and that it fulfils the role that it was designed to execute (thenatureofmarkets, 2017).

7. The problems that accompany a sentiment index

For sure an attempt to try and formulate the sentiment of the market is a valiant one but in such attempts, problems always arise.

The most obvious problems that someone can identify in such situations are more conceptual-philosophical in nature. Although there is that brief discussion around the role of sentiment and their definitions of the term sentiment given by specific researchers, there's no official definition of the sentiment that is widely accepted in the academic-research environment (Bormann, 2013). This a serious issue because if there is no universal definition how someone can objectively formulate such an investor-driving force (Bormann, 2013)? The result is there many different indexes in these times all of them trying to do the same thing, capture investor sentiment (Bormann, 2013).

Another issue of more theoretical content is that the person that tries to make conclusions based on data will tend to have a different and in many cases, a more distorted picture of the situation than the actual participant that acts and takes decisions

inside the market (Bormann, 2013). This may result in the drop of the explanatory power of the index that a specific researcher tries to create (Bormann, 2013).

For the first problem, the answer lies in the selection of the specific index for the purpose of this research. The index that is selected is most widely accepted one and appears in many researches made by different personnel than the ones that created it like the Adam Stivers article published in May 23th 2015 and the Shen, Yu, Zhao macroeconomic paper that was published in the 17th of July 2016. These are only examples but are also proof that the index that is going to be used has won some credibility in the minds of researchers.

For the second type of problem someone can give a purely statistical answer that the reason for such a research is the estimation not the creation of an absolute deterministic function.

Apart from the theoretical problems that may arise, they are indeed some problems that accompany the specific index on a technical level. The most basic is that in the structure of the components of the index there are some specific components that are not related somehow to the investor sentiment (Baker, Wurgrel, 2007).

Another problem that may arise is that some fundamentals may be reflected inside the index and there where attempts from other researchers for these to be ruled out for the index to be more perfected (Stivers, 2013). The researchers also in the vanilla version of the index that is going to be used, have done their own treatment to rule out these fundamentals (Baker, Wurgrel, 2007). After all possible treatments for specific issues that may existed were done, then the components were averaged out in order an index to be created and the possible remaining small issues that were possible to exist to be ruled out (Baker, Wurgrel, 2007). And so the index was completed.

A final issue that someone may say is that the specific index may fit better for stocks. This must be tested first because some components are capable to catch the movement of other markets and this index wasn't constructed as a single use tool but as wide-market index.

8. The role of confidence in Macroeconomics

In January 2013, ECB's monthly bulletin discussed the importance that investor sentiment had played during the years of the crisis and the focus was in context of the Eurozone, which is also the region that the ECB is the central financial regulator (ECB,

2013). From ECB's point of view the specific issue can be considered as a subject with two possible answers (ECB, 2013). On the one hand the sentiment can be considered as a source of information, this is called the information view, for estimating future economic development, on the other hand, there is the animal spirits approach, that is already mentioned in the context of this research, which suggests that a change in the beliefs of the individual doesn't provide only information but it has real casual effect on the fluctuations of the business cycle (ECB, 2013). The animal spirits specifically can provide a useful theoretical context for describing the consumption expenditures (ECB, 2013). The description that the animal spirits framework can give is that a change towards optimism will have an immediate effect upon the short-run consumption expenditures of the individuals, in other terms, expenditures will rise (ECB, 2013).

The empirical evidence upon the role of sentiment in the consumption expenditures from the ECB'S point of view seems to be mixed, although there is plenty of previous researches that tend to provide evidence on the possible link that may exist between consumption and sentiment (ECB, 2013). However, it seems that the area that most evidence suggests the importance of sentiment is when the discussion includes fluctuations in the business cycle (ECB, 2013). The argument that during political or economic shocks it be observed that the volatility in the consumer confidence usually exhibits an upward trend (ECB, 2013).This leads to the hypothesis that it may be the case that confidence indices can have predictive power when possible fluctuations are investigated (ECB, 2013).

When the discussion comes around the concept of the business cycle, it seems that gradually the idea of the "sentiment factor" seems to gain ground in the economic circles (ECB, 2013). The idea is that the expectations that the market participants have about the future, are one of the determinants of the future output that the firms will produce (ECB, 2013). The idea continues with the notion that these expectations can create a response that propagates itself inside the system, with the help of an acceleration mechanism (ECB, 2013). The conclusion was that such ideas are gradually incorporated in various equilibrium models, although theories like the real business cycle theory can't incorporate them (ECB, 2013).

During the conclusion ECB's staff argues that the recent crisis, which gave birth to what is called the Eurozone crisis, was accompanied by large swings in the confidence indices (ECB, 2013). The result was that consumer confidence tend to be

strongly correlated with hard data and additional investigation brought evidence that the relationship may be of the type of cause and effect (ECB, 2013). What made the results interesting is that the relationship between confidence indices and the overall economic activity seems to be link in a non-linear fashion (ECB, 2013). More precisely, the evidence shown that during times where stability seems to be present and the economy functions in a proper manner, confidence indicators seem to experience little to no predictive power (ECB, 2013). However, the case seems to be that during recessions this fact changes completely as it seems that the confidence indicators in volatile times experience large swings and their predictive power becomes significant (ECB, 2013). This may imply that the beliefs and the general psychology that is dominant in the context becomes more evident when uncertainty and volatility rises (ECB, 2013). The final verdict for the issue of the usefulness of the sentiment indices, was that they can be helpful in order to extract information, especially when the changes in these indices are of a large amount, because they may imply that a change in the larger scale of Eurozone's economy, is imminent (ECB, 2013). ECB receives data for the estimation of the indices via interviews on market participants, this is something that has been already mentioned in context of this research (ECB, 2013).

9. Evidence of sentiments role

Schmitz, Glaser and Weber, in an investigation on the subject of warrant traders, concluded that investor sentiment is involved significantly during the financial but only during the short-run (Schmitz et al., 2006). The context that he research took place was the German warrant market and as it was explained in the research this was due the existence of large data sets from discount brokers (Schmitz et al., 2006). The amount of data were capable to contribution into the creation of a time series with daily frequency (Schmitz et al., 2006). Based on information about the structure that the specific market has, the research team was capable to create a specific measure for the investor sentiment that was linked to DAX index (Schmitz et al., 2006).

The first step of the research was for the investors to calculate correlations between the returns of the stock market and the sentiment indices that were used, the one constructed by the research team included (Schmitz et al., 2006). The results from the correlations had shown that the is dependence of the returns in the stock market in changes upon the investor sentiment indices, and in the case when the sentiment was calculated based on the warrant market transactions the results seemed strong her

(Schmitz et al., 2006). A specific attribute of the index that the researchers constructed were that it was based on individual transactions, something that it means that the money of individual were the object that was at stake during every transaction and institutional transactions (Schmitz et al., 2006). The correlations were negative and this shows the tendency for the individual investor to hold more warrants during a period were stock returns are in decline, this usually called contrarian behavior (Schmitz et al., 2006). The next question was if the results from the correlations can be observed in structure that includes lags within it (Schmitz et al., 2006).

The second step of the research employed that VAR framework in order to check for results in structure that contains lags and also the granger causality test (Schmitz et al., 2006). The a-theoretical nature of the VAR framework makes it a very good candidate when the goal is to extract evidence about the relationship that may exist between a set of variables (Brooks, 2008). Their results suggests that it may be the case that changes in investor sentiment influences the stock market returns but the evidence shown that this may happen during the short-run (Schmitz et al., 2006). Also it was shown that the influence that the stock market has upon the investor sentiment, the reverse point of view, was negative but this may be reasonable because the reverse relationship seemed to be positive. The only hypothesis that didn't came with any significant results was a hypothesis that was based on previous authors, that sentiment has stronger influence upon the small stocks (Schmitz et al., 2006).

10. The yield spread and the investor sentiment

Evidence from empirical research suggests that yield spread has the potential to reflect the investor sentiment (Spyrou, 2013). This becomes clearer when the idea of the yield spread is included into the discussion (Spyrou, 2013). Spyrou, based on previous literature around the matter, conducted a research in order to identify the significance of the investor sentiment in the European, and consequently the Greek, crisis (Spyrou, 2013). Based on previous literature, the research was conducted based on the idea that the yield spreads have the potential to provide information about three specific types of risk (Spyrou, 2013):

1. General market risk (Spyrou, 2013).
2. Default risk (Spyrou, 2013).
3. Liquidity risk (Spyrou, 2013).

The differentiation of Spyrou's research was the attempt to incorporate proxies for investor sentiment, combined with fundamental variables that are known that describe the yield spread adequately (Spyrou, 2013). The argumentation of the research was that previous empirical studies were solely focused on the fundamental determinants of the spreads and any type of variable that could may have the property to proxy biases and investor sentiment in general, were neglected (Spyrou, 2013). The main argument for neglecting the sentiment aspect of an investors behaviour as it is presented by Spyrou was that in a market that revolves around fixed income securities doesn't depend in biases as much as an equity market (Spyrou, 2013). On the other hand, it seems the participants of the market hold the belief that the spread is indeed partially determined by the sentiment that exists inside the market (Spyrou, 2013). Further analysis on previous theories are linking the specific market with concepts like overconfidence and also with the feedback loop that was described on the previous section that new information gives fuel for overreaction (Spyrou, 2013).

The research was combination of GARCH and VAR methods, but what was interesting were the results of the effort produced (Spyrou, 2013). The conclusion of the research was that the situation around the spreads was getting worse, even if attempts like rescue packages and other measures to influence the economic fundamentals were made (Spyrou, 2013). This doesn't mean that fundamentals are not to be taken into account, because the results suggested a picture where in both fundamentals and investor sentiment were influencing the spreads, with the investor sentiment to be the only statistically significant negative variable when the monthly changes in the bond spreads were investigated (Spyrou, 2013). As a final detail, it seemed that both current and also lagged investor sentiment had a statistical significance (Spyrou, 2013).

11. The CDS as a metric of investor confidence

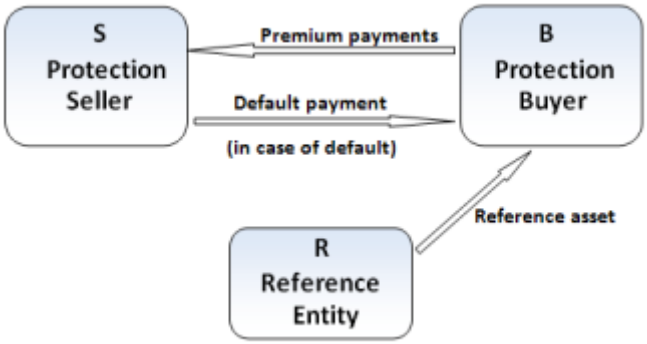
CDS are insurance contracts that hedge the investor from a potential credit risk (Anthropelos, 2010). This type of contract belongs to a large category of financial instruments, the credit derivatives (Anthropelos, 2010). In basic structure is a swap agreement, like the common interest rate swaps, but it is structured in order to counter default events (Anthropelos, 2010). They trade over the counter and as result of this, they may have variation in their structure based on the specific deal that underlies them (Anthropelos, 2010). However, because they consist a specific type of contract which

serves a specific hedging need, they have a general common structure that is going to be presented now:

The vanilla structure of a CDS

The textbook structure that describes the specific type of agreement is based on the idea of investor that because of loss aversion wants to hedge against a default event (Anthropelos, 2010). In a more precise manner, a party is willing to pay a fee to another interest party under the term that it expects a payment from the fee-receiver if a default event will occur (Anthropelos, 2010). As general terminology, the part that is willing to pay the premium is called protection buyer and the party that has to pay in case of default and receives the premium is called protection seller (Anthropelos, 2010).

In the diagram that follows, the presence of a third object of interest is present, the reference entity (Anthropelos, 2010). The reference entity is basically the entity that originally issued the asset that the protective buyer wants to sell, an example may be a state that issued bonds and now low credit rating (Anthropelos, 2010). The diagram shows the vanilla structure of a CDS can be presented:



12. An empirical investigation on the Sovereign CDS spread

The bond spread and the linkage that it seems to have with sentiment of the market was something that has been discussed already (Spyrou, 2013). On the previous section was described what a credit default swap is in general terms and structure. What makes these specific agreements interesting is the fact that it seems that the factors that are influencing them are more complex than pure macroeconomic fundamental variables (Galariotis et al., 2016). In plain terms, the structure and the purpose that a sovereign CDS have, makes it a potential candidate for the existence of a linkage with investor sentiment (Galariotis et al., 2016).

Investigations around the subject of the CDS spread, like Longstaff's in 2011, fetched interesting results when the comparison between local determinants and global was made (Galariotis et al., 2016). The results suggested that the influence that local factors were exercising upon the CDS spread was of minor importance when compared with global factors (Galariotis et al., 2016). This is a very important result because it leads to the conclusion that it may be the case that the overall systemic risk is what drives the Sovereign Debt spreads with one of the factors of influence to be investor sentiment (Galariotis et al., 2016).

Galariotis, Makrichoriti and Spyrou conducted a research upon the subject of the Sovereign debt CDS spread with the purpose to investigative potential spillover effects during the Euro debt crisis (Galariotis et al., 2016). What made the specific research different than previous attempt ad to do with the variables that were used and the econometric method (Galariotis et al., 2016). In terms of variables, in addition to standard macroeconomic fundamental variables, also variables that try to capture the investor sentiment were used (Galariotis et al., 2016). The variables that were used in order to describe the investor sentiment were the ESI index, the ZEW economic indicator and also the NOC index (Galariotis et al., 2016).

In terms of methodology, the panel VAR method was used (Galariotis et al., 2016). This is a modification of the standard vector auto regression model that makes it capable of utilizing panel data (Galariotis et al., 2016).

The first finding the research fetched was revolving around the determinants of variance of the credit default swaps (Galariotis et al., 2016). The evidence suggested the slope of the CDS term structure variance is changing over time and more precisely, it show an upward trend for the peripheral Euro-Countries and a decreasing trend for the rest (Galariotis et al., 2016).

What is of more importance is the evidence about the influence that the investor sentiment had upon the spread of the CDS (Galariotis et al., 2016). The three different indices were used in order to catch different effects in terms of location (Galariotis et al., 2016). Based on this fact, the ESI seemed to act on a local scale, the ZEW in a Eurozone-regional manner and the NOC seemed to act as a proxy for the global market sentiment (Galariotis et al., 2016).

In terms of the goal that the research had, the results were mixed because the determinants were shown to behave in an unstable manner, possibly because of the different levels of economic integration that exists from the one country to the other and also, because the Euro-area is not homogenous (Galariotis et al., 2016). What still remains important is that the link between the investor sentiment the credit default swap spread seemed to exist, because such evidence imply that it may be better when serious economic situations manifest, the government should not focus solely on the standard fundamental variables but instead, it has to find a way to communicate with the market participants in order to avoid panic in the market (Galariotis et al., 2016).

Methodology

1. The concept of cointegration

Cointegration as a phenomenon, is the situation when two non-stationary variables are capable to create a linear combination that is acting in a stationary manner (Johansen, 2004). This is referred in many cases as a long-run equilibrium relationship and is supported by the economic theory that specific types of variables that have a non-stationary character are although linked together in a stationary manner (Zakrajsek, 2009). It is also supported through arbitrage theory that there are case of I (1) financial time series that although are linked together (Zakrajsek, 2009). This situation creates an important framework which provides tools for the extraction of information around non stationary time series (Zakrajsek, 2009).

Two facts about non-stationary time series are the below:

1. Non-stationary variables tend to diverge as T becomes infinite, this happens due to the fact that the unconditional variances of the variables are linked in a proportional manner with T (Zakrajsek, 2009).
2. With the above used as a premise, it is reasonable to conclude that there can be no expectation for such variables to fit in any kind of short-run or long-run equilibrium relationship (Zakrajsek, 2009).

The concept of cointegration is what makes the above statements to collapse, this is also why it is such a crucial concept from an econometric. Therefore, if two variables are cointegrated they can create a stationary linear combination and so, they obey in a long-run equilibrium relationship (Zakrajsek, 2009).

2. The VAR framework

A VAR model can be defined as a regression model that deals with situations were systems need to be investigated, by the term systems it is meant that it exists more than one dependent variable, (Brooks, 2008). It may be said that VAR model is a product of hybridization between the univariate models and the simultaneous regression models (Brooks, 2008). The VAR framework provides the researcher with a good alternative to large-scale simultaneous models, some of the basic advantages of this kind of framework is the flexibility that it has (Brooks, 2004). In general, the advantages that a VAR model has are:

1. No need for specification if one variable is endogenous or exogenous, all the variables in a VAR framework are considered to be endogenous (Brooks, 2008).
2. The allowance that the VAR framework provides to the variable to be depended not only in its own lags or in combinations between white noise terms (Brooks, 2008). This is the characteristic that gives the VAR model the advantage of flexibility over other types of models like the AR (Brooks, 2008).
3. If the non-existence of any kind of contemporaneous terms regarding the equations RHS, the usage of ordinary least squares separately for each equation becomes possible.
4. Evidence suggest that the forecast that VAR framework provides to the researcher is better in comparison with alternatives, especially when it is compared with large-scale structural models (Brooks, 2008). It may be the case that the ad hoc nature of the restrictions that are incorporated in VAR model is the reason for the better performance of the model (Brooks, 2008).

Sadly, in the discipline of econometrics there's no model that comes without its own problems and pitfalls, and this holds also for the case of the VAR models (Brooks, 2008).

1. In the phase of model specification, the information that is based on theory that the model uses about the relationship between the variables is little to none (Brooks, 2008). This makes the VAR models to be considered as a-theoretical (Brooks, 2008).
2. The concept of the lag is essential for a VAR model, but there is an obvious problem with determining the lag structure (Brooks, 2008). The VAR framework uses a plethora of criteria for the researcher to decide about the lag structure, criteria like the AKAIKE information criterion, th Hanna-Queen etc. (Brooks, 2008). Still the decision of the optimal lag structure is a challenging task (Brooks, 2008).
3. With way that the model operates, even in cases where the sample is relatively small, the model tends to estimate too many parameters (Brooks, 2008).
4. In the case that a researcher wants to do hypothesis testing in relation with the coefficients, than the components of the VAR should be all stationary (Brooks, 2008). This contradicts with a general notion around the model that its purpose is to just provide information about the variables and therefore, any kind of

differencing in order to induce stationarity will harm any information around the long-run relationship (Brooks, 2008).

This was a general discussion around the VAR model. It was crucial to be done, because this model will be the central in specific research for two reasons. First, it is going to be used in order to provide information about the variables of interest and second, the VAR framework is used in the attempt of identifying cointegration. More specifically, the Johannsen test that is going to be used in the specific research, is based on the VAR framework.

3. The methodology of this research

The way that the specific research is going to take place is the following. First, a correlation matrix is going to be created in order a general picture to be drawn. The reason for the use of the elementary correlation technique is that it is a common technique in financial investigations to try to capture correlations between the variables of interest because it is a direct way to investigate in the possibility of a relation. Still the correlation capture essentially doesn't mean anything because correlation doesn't imply any type of causation by default. This justifies the initial statement in this section that the use of correlation is the just the introduction to the research, also in the specific case that the results will suggest absence of correlation it won't meant that the research is over. It will just imply that from a general perspective there may be no specific evidence.

Afterwards, a unit root test is going to be conducted in order to test for the possibility of the existence of a common unit root or individual unit roots. This will also help, the correlation matrix credibility to be tested. In general, the existence of unit roots may produce spurious correlations and so, it makes the matrix to be disputable.

The next step will be to conduct a Johansen cointegration test. The existence of cointegration is one of the hypothesis of the research and simultaneously, it becomes crucial to specify such a matter in order to be determined if the model from the next step will be a VAR or a VEC. In addition, the existence of unit roots and cointegration will be a proof of the definition of the cointegration phenomena as it was stated in the beginning of this section.

As the next step of the methodology, the VAR framework will be employed. This a basically the most crucial part of the research. Through the VAR framework

there's going to be an extensive investigation on which variables seem to create changes in other variables and it will be the framework that it will provide an estimation of the optimal lag structure of how the effect of each variable, if it exists, it may be like. The Johannsen test will be the criterion for if a VEC is going to be employed and how many cointegrating vectors it will have.

The focus will be on the impulse response analysis which shows how a variable may behave in a random innovation from another variable. It shows the immediate result and how the variable may behave as periods are passing by.

The variables that are going to be used is the Baker-Wurgler index, the Greek, French and Dutch bond spread, the HICP index, the MSCI index, the ESI index and the industrial production of each of the countries under investigation. The spread is going to be calculated by subtracting the German 10-year bund yield from every 10 year yield of the countries of interest. The ESI index have been download from Eurostat's database, the industrial production and the bond yields were downloaded from FRED St. Louis database and the HCPI was downloaded from ECB database. For each country, two samples for each country, are going to be created. The samples will be of equal size and the ranges are going to be 2005-2007 and 2008 to 2010. The procedure of any sample will be the one explained below and the reason for such an approach is to test between many different samples because if they're going to be results of interest, the frequency of the results in different samples make them more robust.

Analysis

1. The case of Greece

Covariance Analysis: Ordinary
Date: 07/26/17 Time: 09:58
Sample (adjusted): 2005M01 2007M12
Included observations: 36 after adjustments

Covariance Correlation	GREECE_S...	INFLATION_...	GREECE_IN...	MSCI	ESI_EUR...	BAKER_S...
GREECE_SPREAD	0.002591 1.000000					
INFLATION_EURO...	0.007376 0.353107	0.168401 1.000000				
GREECE_INDUST...	0.006757 0.055684	0.580503 0.593395	5.682986 1.000000			
MSCI	0.152633 0.400897	2.025093 0.659763	9.499833 0.532774	55.94595 1.000000		
ESI_EURO19	0.082363 0.326258	1.647683 0.809579	6.086088 0.514764	29.46858 0.794388	24.59712 1.000000	
BAKER_SENTIME...	0.000338 0.042202	0.039748 0.615660	0.191546 0.510723	0.591814 0.502924	0.463368 0.593861	0.024751 1.000000

The first correlation matrix which was created was based on Greece's spread and the rest of the possible explanatory variables. There's a positive, significant correlation between the spread of the Greek bond and inflation, something that economically-wise was expected. There seems to be an insignificant positive correlation between the Greek industry and the spread, which seems odd but it may be the case that Greece is mostly a service-oriented country. The ESI index and the MCSI world growth index seem to be significantly and positively related with the spread of the Greek bond, which is odd as a result. The Baker sentiment index doesn't seem to have any significant correlation with the Greek spread.

Group unit root test: Summary
Series: GREECE_SPREAD, INFLATION_EUROZONE, GREECE_INDUSTRY, MSCI, ESI_EURO19, BAKER_SENTIMENT_INDEX
Date: 07/26/17 Time: 10:00
Sample: 2005M01 2007M12
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 3
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-2.42103	0.0077	6	216
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-2.13659	0.0163	6	216
ADF - Fisher Chi-square	24.5397	0.0172	6	216
PP - Fisher Chi-square	20.5274	0.0577	6	216

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

The next step is the conduction of a Unit root test, using the Group unit root test as provided by the Eviews software. The results seem to be in favor of the absence of a unit root inside the series. The next step is to investigation for possible cointegrating relationships that may exist between the time series.

Date: 07/26/17 Time: 10:04
Sample: 2005M01 2007M12
Included observations: 36
Trend assumption: Linear deterministic trend
Series: GREECE_SPREAD INFLATION_EUROZONE GREECE_INDUSTRY MSCI ESI_EURO19 BAKER_SENTIME...
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.781511	126.0203	95.75366	0.0001
At most 1 *	0.570286	71.26360	69.81889	0.0382
At most 2	0.413941	40.85669	47.85613	0.1933
At most 3	0.332729	21.62062	29.79707	0.3201
At most 4	0.121189	7.056515	15.49471	0.5711
At most 5	0.064645	2.405839	3.841466	0.1209

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

The results from the cointegration test suggest the existence of cointergrating vectors and as it seems, the results are in favor of 2 cointergrating vectors. Based on the results of the test, the model that will be employed will be a VEC, after deciding about the lag structure based on the simple unrestricted VAR lag structure and it will be set for 2 cointergrating vectors.

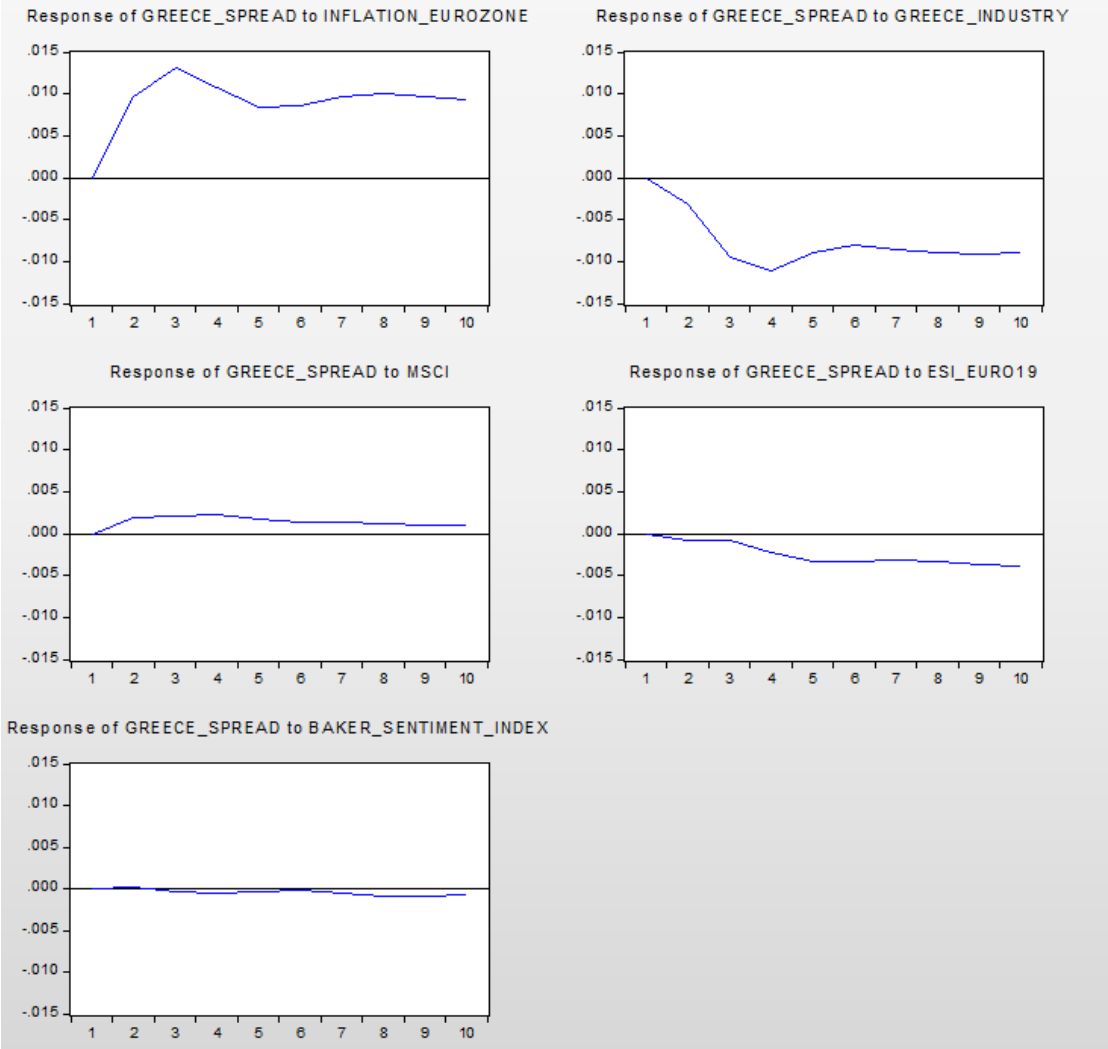
Based on the sample size, 36 observations, the lag structure can't be extend too much but it seems that the optimal lag structure re for this data set is in 1 lag. The results from the VAR lag structure.

VAR Lag Order Selection Criteria
Endogenous variables: GREECE_SPREAD INFLATION_EUROZONE GREECE_INDUSTRY MSCI E...
Exogenous variables: C
Date: 07/26/17 Time: 10:08
Sample: 2005M01 2007M12
Included observations: 36

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-199.5146	NA	0.003662	11.41748	11.68140	11.50959
1	-34.03737	266.6021*	2.84e-06*	4.224298	6.071737*	4.869104
2	0.158860	43.69518	3.73e-06	4.324508	7.755465	5.522004
3	44.76674	42.12967	3.84e-06	3.846292	8.860769	5.596479
4	105.1781	36.91805	3.40e-06	2.490105*	9.088101	4.792983*

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

As it can be seen from the VAR lag structure, most criteria are concentrated on 1 lag. So, the model that will be used is vector error correction model with 1-1 lags and 2 cointergrating vectors. From the specific VEC model, the impulse response will be provided in-text for discussion and observation. The goal is the observation of the Greek spread response to random innovations from the side of the explanatory variables.



The VEC impulse response provides interesting results for discussion. The Greek spread seems to rise sharply after the introduction of a random innovation from the of the Eurozone's inflation index, this is a text-book economics relationship, inflation makes the demand for governmental bonds to decrease.

There seems to be an inverse relationship with the Greece's industrial index, also this is an expected result, the industrial sector is a fundamental macroeconomic variable and well-functioning industry is expected to lead to a drop of the bond spread. It is good to mention that the results contradict the correlation matrix. In the end, correlation doesn't mean causation and in general is wiser for the estimations to be based on a wider analysis.

The response to a shock from MSCI seem to be irrelevant, it seems to be a small scope, turbulent but overall, it is persistent.

The relationship with the ESI index seems to be in favor of investor sentiment as a determinant of a bonds spread. A rise in the ESI index seems to lead to sharp decrease of the spread and the down slope seems to persist as periods are changing.

The response to a random innovation from the side of Baker-Wurgler index seems to be the same as in the case of the ESI. Although more turbulent, it leads to a decrease in the spread, a decrease that seems persistent.

The results that were drawn from the pre-crisis are consistent economic theory and it seems, for the specific sample, that investor sentiment can be considered as a determinant of the Greek bonds spread for the pre-crisis era. It is important to be underlined that in all cases, even with MSCI that seemed irrelevant, the results seem to be persistent as time passes.

The next sample that is going to be used, is the in-crisis sample for Greece. The procedure that will be followed is exactly the same.

Covariance Analysis: Ordinary
Date: 07/26/17 Time: 10:43
Sample (adjusted): 2008M01 2010M12
Included observations: 36 after adjustments

Covariance Correlation	GREECE_S...	INFLATION_...	GREECE_IN...	MSCI	ESI_EUR...	BAKER_S...
GREECE_SPREAD	7.657700 1.000000					
INFLATION_EURO...	-0.650616 -0.696529	0.113939 1.000000				
GREECE_INDUST...	-16.93338 -0.761900	2.025505 0.747138	64.50490 1.000000			
MSCI	7.617076 0.277579	-0.028139 -0.008407	7.206555 0.090485	98.33449 1.000000		
ESI_EURO19	13.51294 0.405670	-0.852876 -0.209905	-6.521343 -0.067455	113.5593 0.951355	144.8953 1.000000	
BAKER_SENTIME...	-0.212141 -0.315539	0.043327 0.528322	1.234338 0.632579	1.430324 0.593688	1.432469 0.489818	0.059026 1.000000

Also in the in-crisis correlation matrix shows some oddities in relation with the spread. The inflation seems to be negatively related, which is an odd result. The correlation of the spread became significant and negative, which is an expected result. MSCI seems to be positively related, another oddity, and the same seems to hold also for the case of the ESI Index. On the other hand the Baker index seems to be negatively related with spread, which was something to be expected.

The next step is the group unit root test.

Group unit root test: Summary
Series: GREECE_SPREAD, INFLATION_EUROZONE, GREECE_INDUSTRY, MSCI, ESI_EURO19, BAKER_SENTIMENT_INDEX
Date: 07/26/17 Time: 10:45
Sample: 2008M01 2010M12
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 2
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	0.05706	0.5228	6	216
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	0.53993	0.7054	6	216
ADF - Fisher Chi-square	9.55872	0.6546	6	216
PP - Fisher Chi-square	9.10499	0.6939	6	216

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

In the specific sample the evidence suggests that it may be the case that a unit root exists. The possibility of the existence of a unit root is making the correlation matrix irrelevant in this case, it may be spurious relationships, but the procedure holds on in terms of the investigation for the presence of cointergration. The results from the cointergration test are provided below.

Date: 07/26/17 Time: 13:07
Sample: 2008M01 2010M12
Included observations: 36
Trend assumption: Linear deterministic trend
Series: GREECE_SPREAD INFLATION_EUROZONE GREECE_INDUSTRY MSCI ESI_EURO19 BAKER_SENTIME...
Lags interval (in first differences): No lags

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.805862	123.7973	95.75366	0.0002
At most 1	0.575160	64.78668	69.81889	0.1180
At most 2	0.439383	33.96913	47.85613	0.5035
At most 3	0.236643	13.13533	29.79707	0.8853
At most 4	0.089919	3.414295	15.49471	0.9450
At most 5	0.000620	0.022322	3.841466	0.8811

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

The results are again in favor of the existence of cointegrating vectors and the most likely scenario seems to be the case of 1 vector. The lag structure that was decided

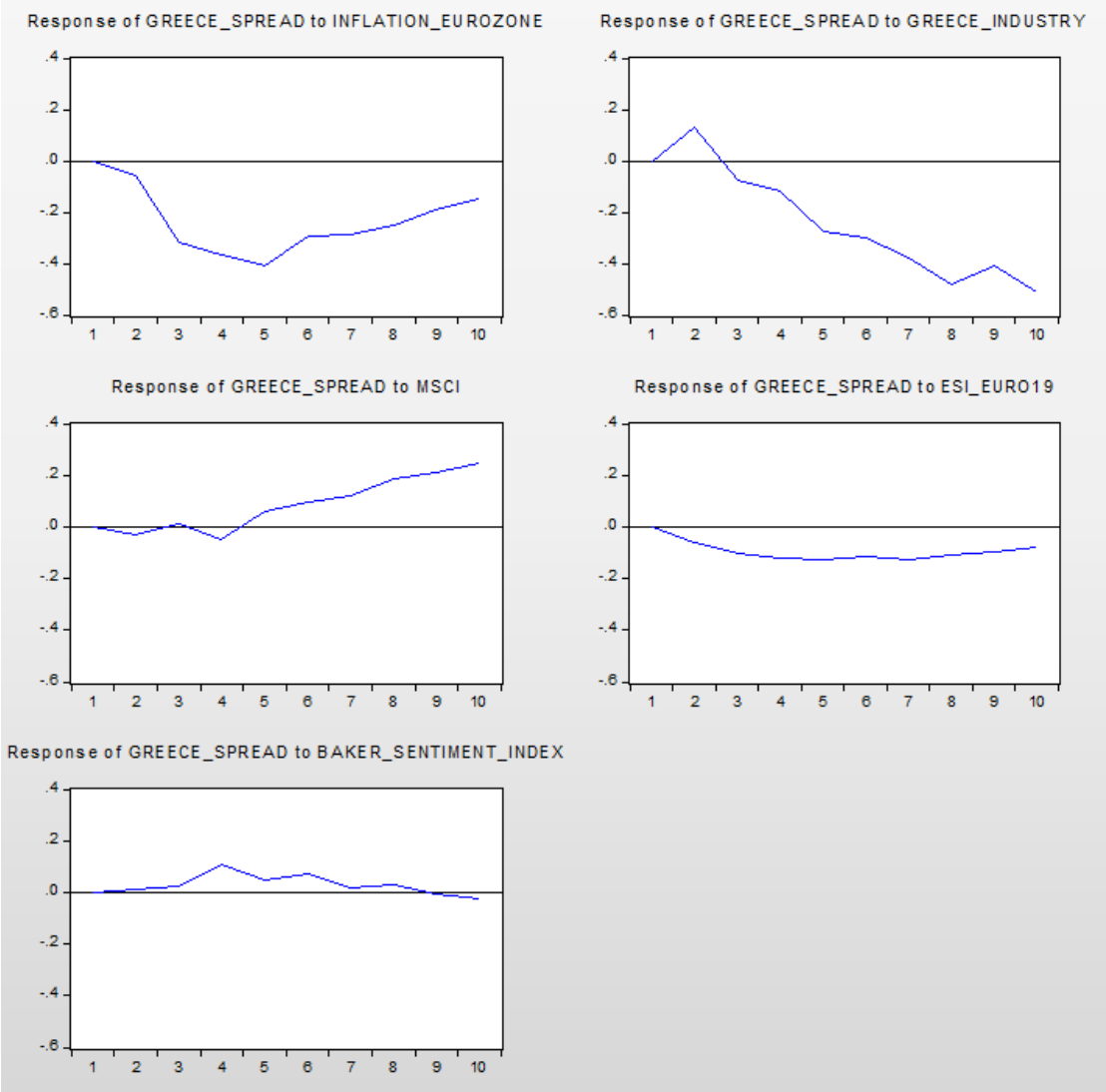
was again based on the VAR lag structure, and it seems that three lags are the optimal. The results from the lag structure are following:

VAR Lag Order Selection Criteria
Endogenous variables: GREECE_SPREAD INFLATION_EUROZONE GREECE_INDUSTRY MSCI E...
Exogenous variables: C
Date: 07/26/17 Time: 10:47
Sample: 2008M01 2010M12
Included observations: 36

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-385.6916	NA	113.6891	21.76064	22.02456	21.85276
1	-218.6629	269.1018	0.080790	14.48127	16.32871	15.12608
2	-158.1002	77.38560	0.024577	13.11668	16.54764	14.31418
3	-89.96433	64.35058*	0.006843	11.33135	16.34583	13.08154
4	-15.64831	45.41535	0.002795*	9.202684*	15.80068*	11.50556*

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Now that the lag results have been demonstrated, the procedure continues with the impulse response analysis.



The response to a random shock from the side of inflation, seems to be abnormal. On the other hand Greece slide in one of the most serious recessions in the country's history and at the same time the index is for the whole of Eurozone, therefore, the results from the other countries are need in order the picture to be clearer.

The response to a shock from the industry seems to be expected from the point of view of economic theory, as it seems to be down-slope and persistent.

The crisis sample seems to show evidence of a turbulent but still negative relationship between the MSCI and the spread. A rise in the MSCI seems to bring a decline in the spread and after a volatile negative trend, it somehow becomes irrelevant again. It doesn't seem persistent but it was something to be expected.

Finally, the ESI sentiment index seems to produce a negative response to the spread, which was expected as a result. The same thing doesn't seem to hold for the

Baker-Wurgler index which seems to be irrelevant. The response is turbulent, of a small magnitude and it doesn't hold for too many periods, therefore, it can be said that it seems to have no influence in this sample. It may be the case that the Baker-Wurgler index is constructed to be a wide market index in contrast with the ESI which is designed to be a regional index.

The analysis of the Greek case has been completed. The same procedure will continue for the Countries France and Netherlands.

2. The case of France

Covariance Analysis: Ordinary
Date: 07/26/17 Time: 13:43
Sample (adjusted): 2005M01 2007M12
Included observations: 36 after adjustments

Covariance Correlation	FRANCE_S...	INFLATION_...	FRANCE_IN...	MSCI	ESI_EUR...	BAKER_S...
FRANCE_SPREAD	0.001044					
	1.000000					
INFLATION_EURO...	0.005074	0.168401				
	0.382684	1.000000				
FRANCE_INDUST...	0.012213	0.509175	2.796667			
	0.226007	0.741950	1.000000			
MSCI	0.070570	2.025093	7.818561	55.94595		
	0.291983	0.659763	0.625061	1.000000		
ESI_EURO19	-0.002239	1.647683	5.846019	29.46858	24.59712	
	-0.013972	0.809579	0.704852	0.794388	1.000000	
BAKER_SENTIME...	0.001529	0.039748	0.147336	0.591814	0.463368	0.024751
	0.300735	0.615660	0.560002	0.502924	0.593861	1.000000

The pre-crisis correlation matrix for France is demonstrated above. The relationship between the spread of France and inflation index of Eurozone is significant and positive, an expected result. The industry and MSCI relationship seems an odd, its positive, and also the Baker-Wurgler index has a positive relationship. The relationship with the ESI is negative but it is insignificant. The process continues with the unit root test.

Group unit root test: Summary
Series: FRANCE_SPREAD, INFLATION_EUROZONE, FRANCE_INDUSTRY
, MSCI, ESI_EURO19, BAKER_SENTIMENT_INDEX
Date: 07/26/17 Time: 13:47
Sample: 2005M01 2007M12
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 3
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-1.46602	0.0713	6	216
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-0.06675	0.4734	6	216
ADF - Fisher Chi-square	11.7941	0.4624	6	216
PP - Fisher Chi-square	19.8837	0.0693	6	216

** Probabilities for Fisher tests are computed using an asymptotic Chi
-square distribution. All other tests assume asymptotic normality.

The results are in favor of the presence of unit roots, therefore, correlation matrix may include spurious relationships. Again, it doesn't produce any more trouble in the process and so, the cointergration test will be conducted as a next step.

Date: 07/26/17 Time: 14:08
Sample: 2005M01 2007M12
Included observations: 36
Trend assumption: Linear deterministic trend
Series: FRANCE_SPREAD INFLATION_EUROZONE FRANCE_INDUSTRY MSCI ESI_EURO19 BAKER_SENTIME...
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.851994	153.7848	95.75366	0.0000
At most 1 *	0.681251	85.00661	69.81889	0.0019
At most 2	0.444507	43.84597	47.85613	0.1132
At most 3	0.353417	22.68159	29.79707	0.2620
At most 4	0.152700	6.983636	15.49471	0.5795
At most 5	0.027893	1.018424	3.841466	0.3129

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

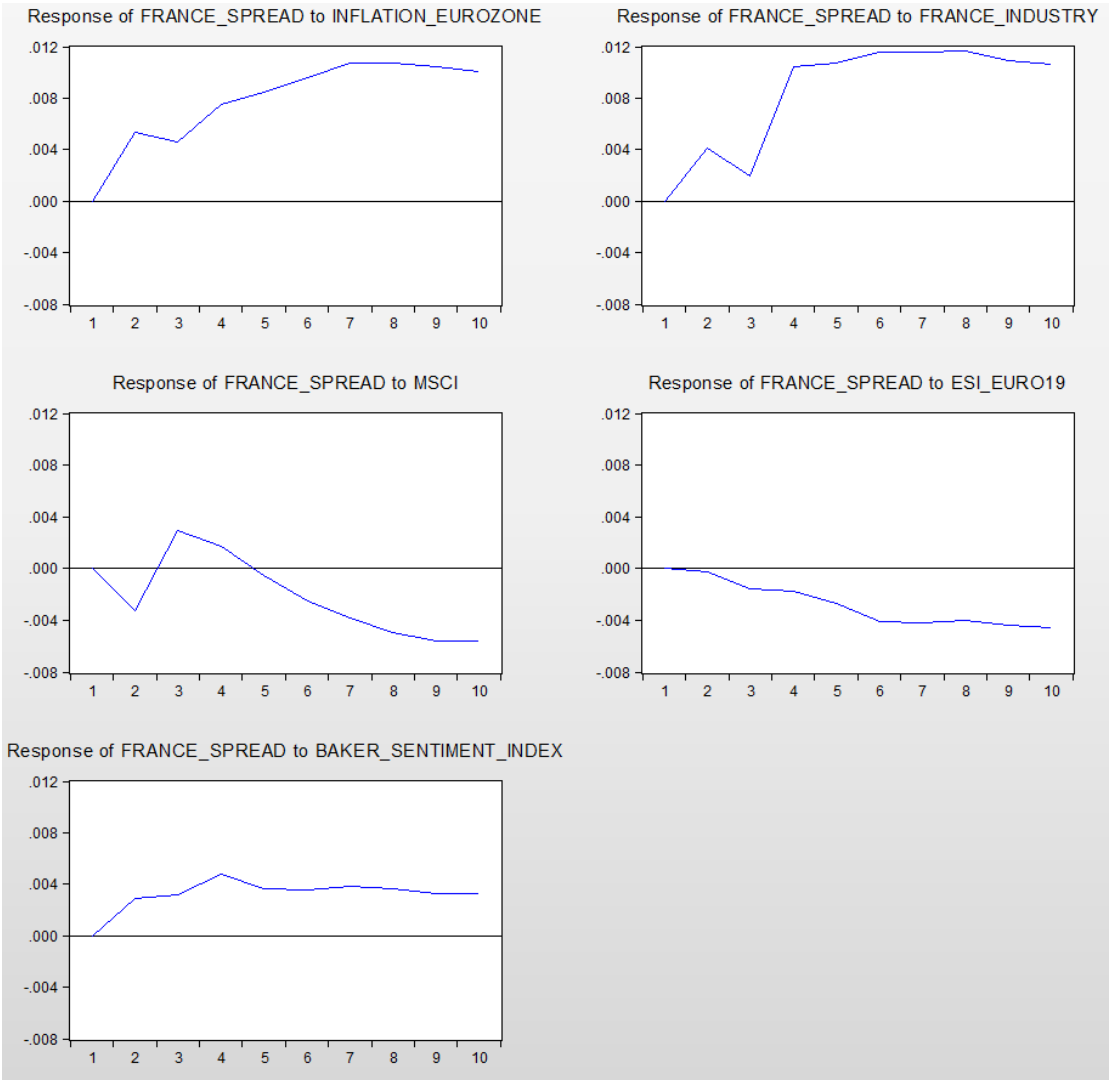
The results are in favor of 2 cointegrating vectors, at most. The results from the VAR lag structure is in favor 2 lags. Therefore based on the results above and the lag structure that is shown below, a VEC with 2 cointegrating vectors and 2 lags is going to be estimated.

VAR Lag Order Selection Criteria
Endogenous variables: FRANCE_SPREAD INFLATION_EUROZONE FRANCE_INDUSTRY MSCI ES...
Exogenous variables: C
Date: 07/26/17 Time: 14:10
Sample: 2005M01 2007M12
Included observations: 36

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-148.0616	NA	0.000210	8.558975	8.822895	8.651090
1	15.25010	263.1132	1.83e-07	1.486106	3.333544*	2.130911
2	62.18077	59.96696*	1.19e-07	0.878846	4.309804	2.076342*
3	107.6080	42.90354	1.17e-07*	0.355109*	5.369586	2.105296

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Now the procedure of the pre-crisis France will be completed with the presentation and discussion of the impulse response.



The impulse response for the pre-crisis France shows some interesting results, accompanied with some oddities. The response of the French spread to a rise in the inflation rate is a sharp rise in the spread, which is something that can be easily explained by economic theory. The response to the industry is odd, a rise in the industrial output brings a rise in the spread which after one period becomes larger and persistent. The relationship with the MSCI although it seems turbulent in the first periods, it is negative and persistent which is something that can be accepted based on economic rationale. A random innovation in the ESI brings a drop in the French spread, which is a result that was expected. The next oddity is the relationship of the French spread with the Baker-Wurgler index, which seems that the spread rise as the sentiment index rises.

Apart from oddities, the rest of the results are in favor of the scope of this research and it is important that for one more time, the responses seem to be persistent with a specific trend. The procedure continues with the in-crisis sample of France.

Covariance Analysis: Ordinary
Date: 07/26/17 Time: 14:36
Sample (adjusted): 2008M01 2010M12
Included observations: 36 after adjustments

Covariance Correlation	FRANCE_S...	INFLATION_...	FRANCE_IN...	MSCI	ESI_EUR...	BAKER_S...
FRANCE_SPREAD	0.014369 1.000000					
INFLATION_EURO...	-0.014364 -0.355006	0.113939 1.000000				
FRANCE_INDUST...	-0.612157 -0.757727	1.116391 0.490727	45.42358 1.000000			
MSCI	-0.762778 -0.641706	-0.028139 -0.008407	42.91519 0.642122	98.33449 1.000000		
ESI_EURO19	-0.852264 -0.590660	-0.852876 -0.209905	43.45481 0.535636	113.5593 0.951355	144.8953 1.000000	
BAKER_SENTIME...	-0.020951 -0.719394	0.043327 0.528322	1.371934 0.837856	1.430324 0.593688	1.432469 0.489818	0.059026 1.000000

The results for in-crisis sample for the French spread are seem to be all negative and significant. The Oddity in this case is the negative relationship with the inflation rate. The unit root test will provide a better picture if the correlations have the possibility to be spurious.

Group unit root test: Summary
Series: FRANCE_SPREAD, INFLATION_EUROZONE, FRANCE_INDUSTRY
, MSCI, ESI_EURO19, BAKER_SENTIMENT_INDEX
Date: 07/26/17 Time: 14:39
Sample: 2008M01 2010M12
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 2
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-1.14788	0.1255	6	216
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-0.93651	0.1745	6	216
ADF - Fisher Chi-square	12.7509	0.3874	6	216
PP - Fisher Chi-square	11.9323	0.4511	6	216

** Probabilities for Fisher tests are computed using an asymptotic Chi
-square distribution. All other tests assume asymptotic normality.

The results are also in the specific sample in favor of the presence of unit roots. Therefore the validity of the correlation matrix can be in dispute. The process continues with the cointergration test.

Date: 07/26/17 Time: 14:53
Sample: 2008M01 2010M12
Included observations: 36
Trend assumption: Linear deterministic trend
Series: FRANCE_SPREAD INFLATION_EUROZONE FRANCE_INDUSTRY MSCI ESI_EURO19 BAKER_SENTIME...
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.758763	157.0455	95.75366	0.0000
At most 1 *	0.708845	105.8543	69.81889	0.0000
At most 2 *	0.591062	61.43399	47.85613	0.0016
At most 3	0.344343	29.24305	29.79707	0.0578
At most 4	0.250040	14.04685	15.49471	0.0817
At most 5	0.097381	3.688354	3.841466	0.0548

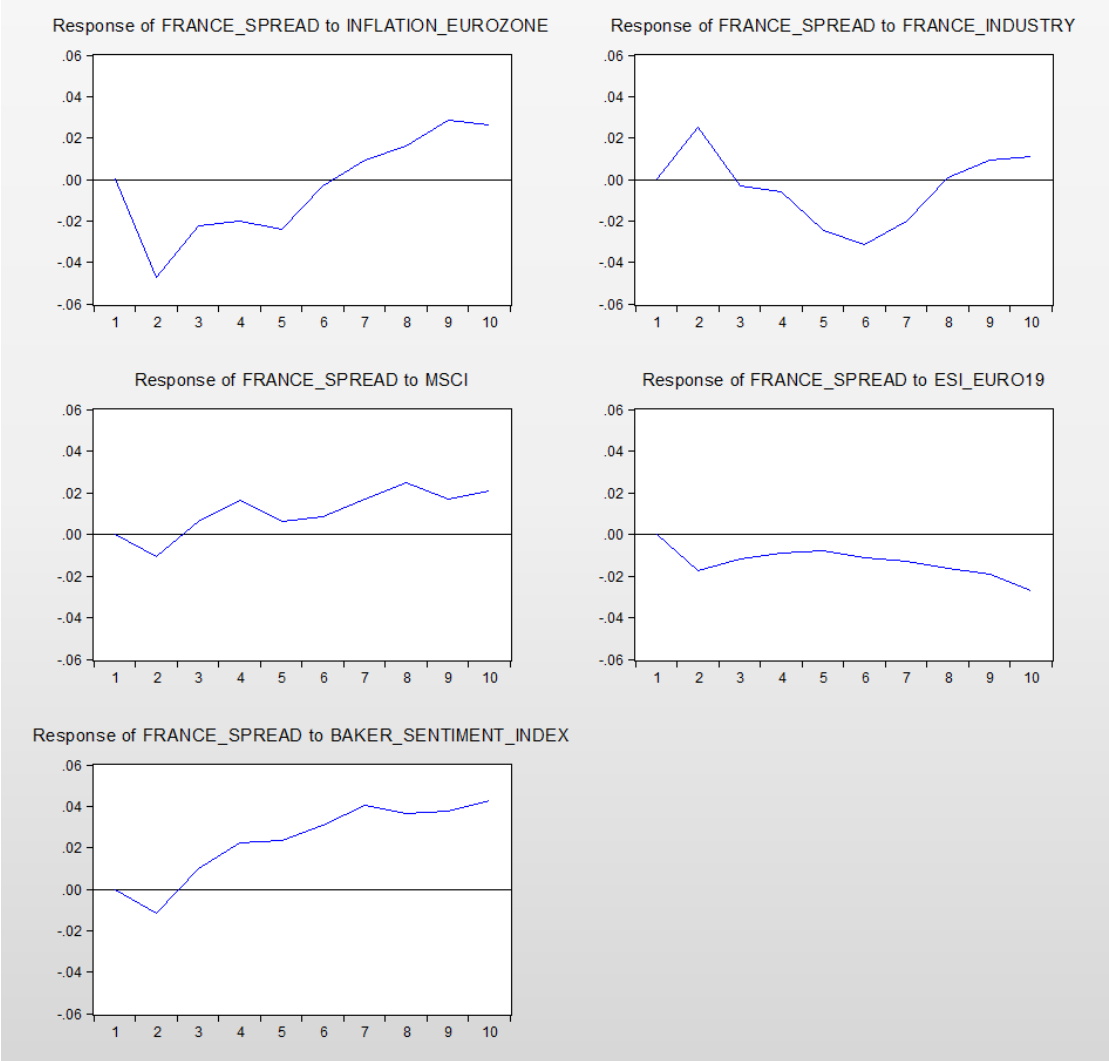
Trace test indicates 3 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

The results of the cointergration test are in favor of the existence of cointergration vectors. The decision will be in favor of the 3 vectors. The lag structure for the VEC is going to be 3. The procedure continues with the impulse response analysis, after the presentation of optimal lag structure.

VAR Lag Order Selection Criteria
Endogenous variables: FRANCE_SPREAD INFLATION_EUROZONE FRANCE_INDUSTRY MSCI ES...
Exogenous variables: C
Date: 07/27/17 Time: 10:14
Sample: 2008M01 2010M12
Included observations: 36

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-263.9736	NA	0.131514	14.99853	15.26245	15.09065
1	-106.0001	254.5128	0.000155	8.222229	10.06967	8.867034
2	-43.24911	80.18184	4.16e-05	6.736061	10.16702	7.933558
3	24.74400	64.21571*	1.17e-05*	4.958667*	9.973143*	6.708853*

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion



The impulse response analysis seems to include mixed results for the in-crisis French spread. The immediate result of an innovation from the side of inflation seems

to be a drop in the spread, but as the periods are progressing the result is the expected rise in the spread.

In the case of the industry it can be observed that the immediate response to a rise in the industrial output is a rise in spread but as the periods are progressing, the spread drops and in the end rises again. For the most part the relationship is the expected, although it can be considered turbulent.

The response to the ESI is in favor that the investor sentiment can act as a determinant of the spread of France. The response that the spread show when the ESI rises, the spread drops. The response to ESI is maybe the most stable result in the specific response analysis.

The response to MSCI is a rise in the spread, which can be considered as strange and the same can be told for the response of the French spread to the Baker-Wurgler index. It can be told that the peculiarities that can be observed may be due to the fact that the Euro-crisis created pressure to the majority of the Euro group economies. France, even if it can be considered as one of the largest economies of the group and also one the stable, found itself in pressure too. So the positive response from a rise in the MSCI and behaviors like this may be due to deeper, systemic problems that the country is facing and these issues are reflected in the spread. Moreover, the sentiment index that acted as a determinant in this sample was the ESI how is designed as a local index. The baker shows another type of behavior and more specifically, it seems that as long as the global sentiment recovers, France is still in pressure. The Baker index I designed based in the structure of Wall Street, so it can be considered as a measure of global sentiment.

The final step before the general discussion is going to be the analysis of the pre-crisis and in-crisis Netherlands.

3. The case of Netherlands

Covariance Analysis: Ordinary
Date: 07/27/17 Time: 11:32
Sample (adjusted): 2005M01 2007M12
Included observations: 36 after adjustments

Covariance Correlation	NETHERLA...	INFLATION_...	NETHERLA...	MSCI	ESI_EUR...	BAKER_S...
NETHERLANDS_S...	0.001334 1.000000					
INFLATION_EURO...	0.007128 0.475510	0.168401 1.000000				
NETHERLANDS_I...	0.081024 0.702158	0.899427 0.693781	9.980270 1.000000			
MSCI	0.157443 0.576276	2.025093 0.659763	15.54177 0.657726	55.94595 1.000000		
ESI_EURO19	0.052709 0.290962	1.647683 0.809579	6.937029 0.442752	29.46858 0.794388	24.59712 1.000000	
BAKER_SENTIME...	0.001866 0.324741	0.039748 0.615660	0.246798 0.496558	0.591814 0.502924	0.463368 0.593861	0.024751 1.000000

The pre-crisis correlation matrix for Netherlands is composed of positive correlations that are significant. This results produces peculiarities that are same like the previous cases. It is good to be stretched again that a correlation doesn't mean many things by itself. Therefore, the next step is the conduction of the unit root test.

Group unit root test: Summary
Series: NETHERLANDS_SPREAD, INFLATION_EUROZONE, NETHERLANDS_INDUSTRY, MSCI, ESI_EURO19, BAKER_SENTIMENT_INDEX
Date: 07/27/17 Time: 11:49
Sample: 2005M01 2007M12
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 3
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-1.52796	0.0633	6	216
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-0.11532	0.4541	6	216
ADF - Fisher Chi-square	11.8843	0.4550	6	216
PP - Fisher Chi-square	9.40065	0.6684	6	216

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

The results are in favor of the existence of unit roots, although the probability for the common unit root is marginal. The next step will be the same as in the rest of cases, the use of the Johannsen cointergration test.

Date: 07/27/17 Time: 11:53
Sample: 2005M01 2007M12
Included observations: 36
Trend assumption: Linear deterministic trend
Series: NETHERLANDS_SPREAD INFLATION_EUROZONE NETHERLANDS_INDUSTRY MSCI ESI_EURO19 BA...
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.724755	108.7936	95.75366	0.0047
At most 1	0.488535	62.35020	69.81889	0.1704
At most 2	0.425525	38.21308	47.85613	0.2928
At most 3	0.228771	18.25830	29.79707	0.5470
At most 4	0.199615	8.906572	15.49471	0.3741
At most 5	0.024439	0.890722	3.841466	0.3453

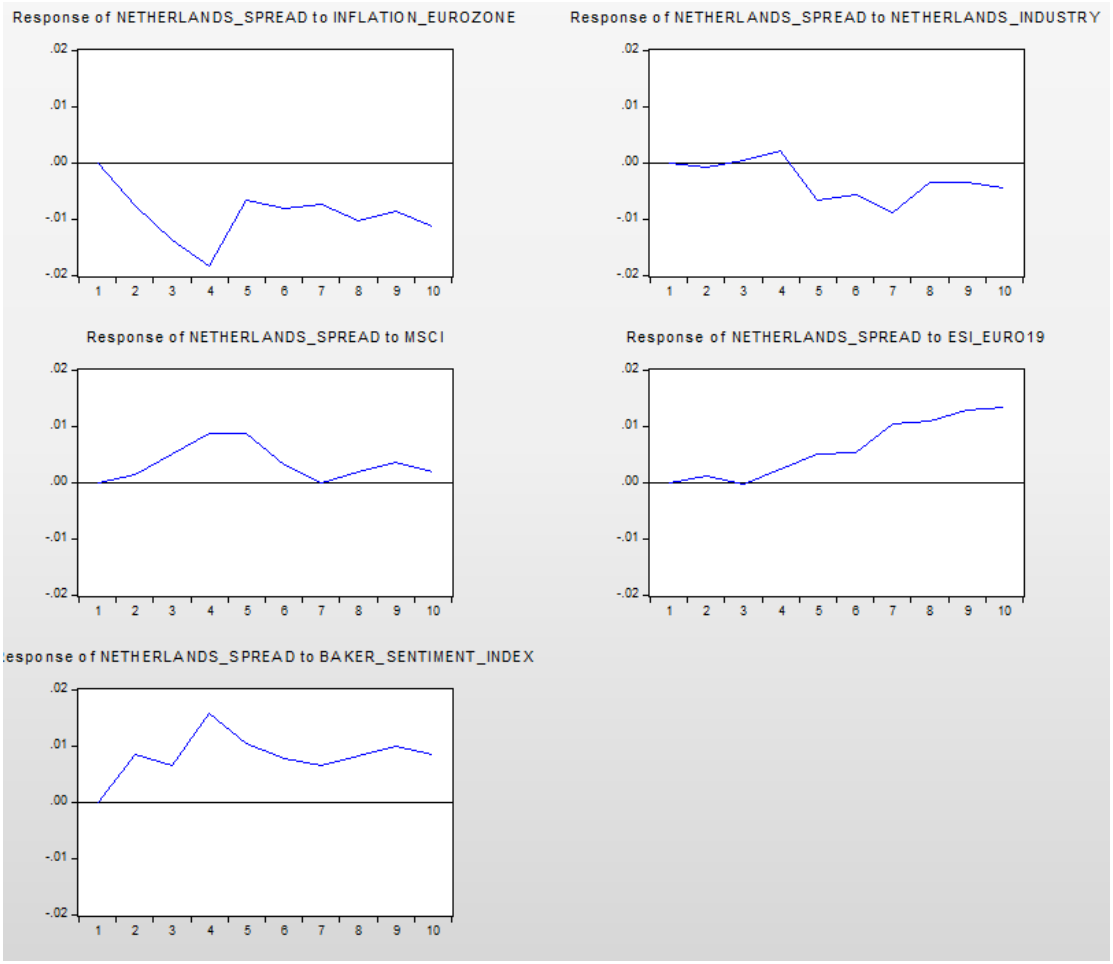
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

There seem to be evidence of the existence of one cointergrating vector. The lag structure decided is going to be three lags. After the presentation of the optimal lag structure, the estimation of the VEC is going to take place.

VAR Lag Order Selection Criteria
Endogenous variables: NETHERLANDS_SPREAD INFLATION_EUROZONE NETHERLANDS_INDU...
Exogenous variables: C
Date: 07/27/17 Time: 11:56
Sample: 2005M01 2007M12
Included observations: 36

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-172.2388	NA	0.000805	9.902154	10.16607	9.994269
1	-10.87822	259.9698	7.84e-07	2.937679	4.785118*	3.582485*
2	18.60102	37.66792	1.34e-06	3.299943	6.730901	4.497440
3	73.68678	52.02544*	7.70e-07*	2.239623*	7.254100	3.989810

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion



The impulse response for the pre-crisis Netherlands seems to be composed of abnormal results. The impulse response to the inflation is sharply negative, which is something not expected. The response to industry after 4 periods seems to be a drop that as periods are passing it somehow corrects itself. The response to the MSCI is mixed as it seems to be a rise and then again, a drop. Have traits like Frances and contains also some peculiarities that have been already observed in the analysis of other samples.The response to a rise in the ESI and the Wurgler index is a rise in the spread.

The final sample that has been left for analysis is the in-crisis Netherlands.

Covariance Analysis: Ordinary
Date: 07/27/17 Time: 12:39
Sample (adjusted): 2008M01 2010M12
Included observations: 36 after adjustments

Covariance Correlation	NETHERLA...	INFLATION_...	NETHERLA...	MSCI	ESI_EUR...	BAKER_S...
NETHERLANDS_S...	0.025419 1.000000					
INFLATION_EURO...	-0.000728 -0.013532	0.113939 1.000000				
NETHERLANDS_I...	-0.504713 -0.736004	0.116344 0.080136	18.49960 1.000000			
MSCI	-1.390131 -0.879265	-0.028139 -0.008407	34.01669 0.797550	98.33449 1.000000		
ESI_EURO19	-1.725694 -0.899195	-0.852876 -0.209905	41.15787 0.794959	113.5593 0.951355	144.8953 1.000000	
BAKER_SENTIME...	-0.023341 -0.602571	0.043327 0.528322	0.706414 0.676012	1.430324 0.593688	1.432469 0.489818	0.059026 1.000000

The in-crisis sample for the Netherlands could be said that it looks similar to France's in crisis sample. The correlations in all the cases have become negative, and the correlation of the spread with the inflation rate has become irrelevant. The correlation with the industry have become significant and the same goes for the rest of the variables. The next step will be the unit root test.

Group unit root test: Summary
Series: NETHERLANDS_SPREAD, INFLATION_EUROZONE, NETHERLANDS_INDUSTRY, MSCI, ESI_EURO19, BAKER_SENTIMENT_INDEX
Date: 07/27/17 Time: 12:44
Sample: 2008M01 2010M12
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 2
Newey-West automatic bandwidth selection and Bartlett kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-0.85130	0.1973	6	216
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-0.97764	0.1641	6	216
ADF - Fisher Chi-square	13.2899	0.3483	6	216
PP - Fisher Chi-square	13.1990	0.3547	6	216

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

The result of the unit-root test is the same like the rest of the unit root tests conducted, and the results are in favor of the existence of unit roots. The results are harming the credibility of the correlation matrix, therefore, the procedure continues with the cointergration test.

Date: 07/27/17 Time: 12:47
Sample: 2008M01 2010M12
Included observations: 36
Trend assumption: Linear deterministic trend
Series: NETHERLANDS_SPREAD INFLATION_EUROZONE NETHERLANDS_INDUSTRY MSCI ESI_EURO19 BA...
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.834298	153.6346	95.75366	0.0000
At most 1 *	0.621865	88.92234	69.81889	0.0007
At most 2 *	0.530676	53.91216	47.85613	0.0121
At most 3	0.351149	26.67953	29.79707	0.1097
At most 4	0.237929	11.10765	15.49471	0.2050
At most 5	0.036161	1.325902	3.841466	0.2495

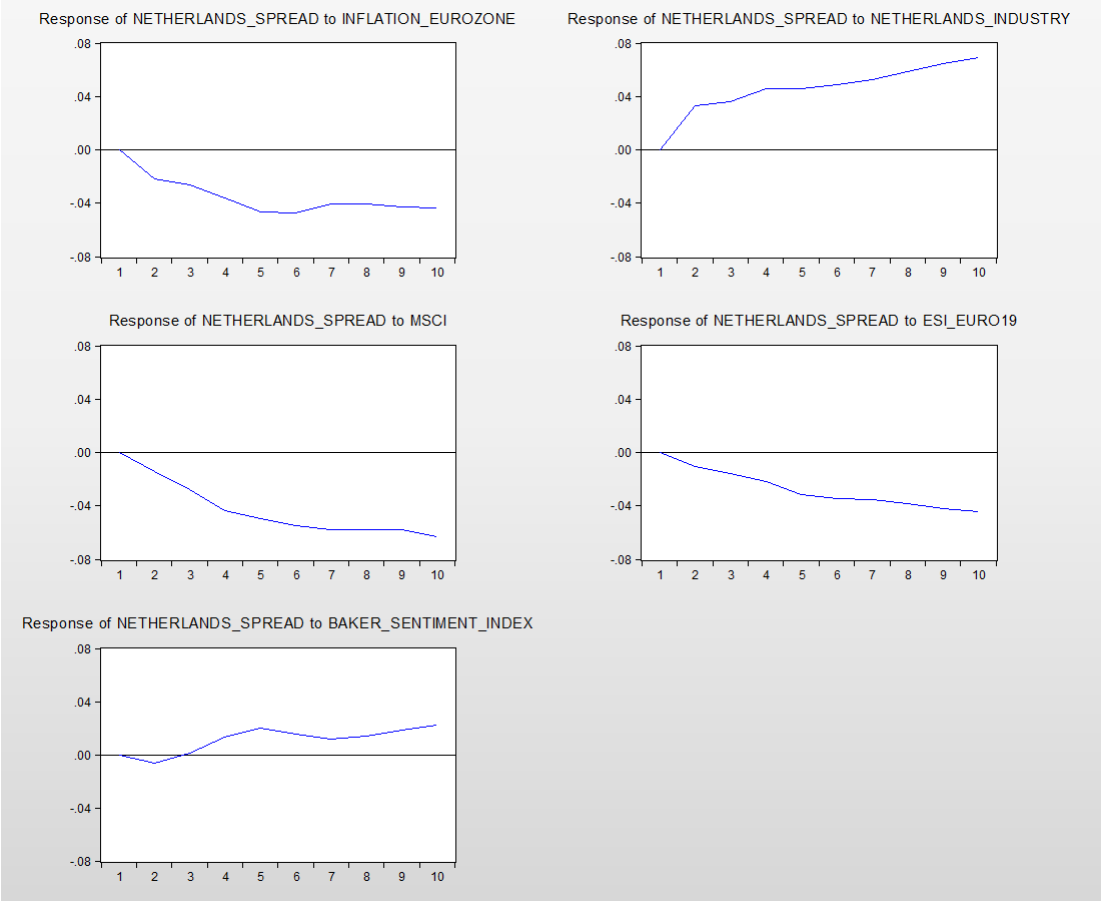
Trace test indicates 3 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

The results in the specific case can be considered as disputable. There seem to be evidence of cointergrating vectors. The decision will be the use of VEC with 3 cointergrating vectors and a lag structure set in two lags, as it can be observed from the optimal lag structure. Then, the impulse response analysis will be conducted for the final sample of the investigation.

VAR Lag Order Selection Criteria
Endogenous variables: NETHERLANDS_SPREAD INFLATION_EUROZONE NETHERLANDS_INDU...
Exogenous variables: C
Date: 07/27/17 Time: 12:51
Sample: 2008M01 2010M12
Included observations: 36

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-242.7481	NA	0.040444	13.81934	14.08326	13.91145
1	-115.9368	204.3071	0.000268	8.774265	10.62170*	9.419071
2	-67.60473	61.75761*	0.000161*	8.089152	11.52011	9.286648*
3	-29.01547	36.44541	0.000232	7.945304*	12.95978	9.695491

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion



The results are mixed for one more time, in terms of fundamentals. The response to the inflation is the opposite of the expected and the same holds for the response in industry. The response to the Baker-Wurgler index is in determinant and somehow negligible as it seems to cause a rise but is turbulent and of small magnitude. The interesting part is the response to the MSCI and the ESI. Both a rise in MSCI and in the ESI index seems to cause a drop in the spread. The drop is persistent for the rest of the periods, without any sign of correction or turbulence.

The analysis part has finished, now it's time for the general discussion of the results.

General Discussion

In all the cases there were peculiarities in the data results. Still, there are some interesting points to be made that are in favor of the hypotheses of this research. It seems that there were evidence of cointergration in every case that was analyzed, which was one of the hypotheses of this research. Second, it seems that investor sentiment plays a role as a determinant of the spread and in the case of the Eurozone, the ESI index seems capable to capture the mood of the market. It is interesting that the results in most cases seem to be persistent as periods are passing, something that can be considered as a long run relationship. The baker Wurgler index didn't perform as was expected, but this on the other hand may be considered a matter of local vs Global scale and that the ESI is designed in order to capture the sentiment of the Euro group. What is important is that it seems that investor sentiment matters and that it also matters as time passes by. In some cases it be argued that there are signs of inertia that need some time in order for the effect to be observed.

In terms of the lag structure, the smallest interval was one and the results were in favor of lagged values. It is common in economics to observe inertia in the beginning and the effect of a change to be gradually perceived as time passes by. So it can be said that the lag hypothesis cannot be rejected based on the specific results.

The hypothesis of risk aversion and bond quality doesn't seem to hold. Especially for the case of the ESI, it wasn't a specific country that seemed to be influenced but countries that are different.

On the other hand there were peculiarities from the responses to the fundamentals. It is interesting that in many cases when the response to the fundamentals seemed odd, the response to the sentiment was reasonable in an economic sense. Maybe the interesting result is that it seems that the variables were function better when the discussion was about the in-crises samples. It may be argued that indeed, the crises made the investors sentiment to play a more catalytic role, maybe due to overreaction or due to loss aversion. It also can be argued that oddities that appear in the in-crisis samples, are due to the fact that fundamentals during heavy economic crashes, lose their predicting power. The Euro-crisis although it had major impact in specific countries, the pressure from the event was reflected also in the rest of the countries. Based on this fact, it may be argued that the peculiar relationship with inflation that can be observed

is basically due to the fact that inflation during a financial crisis may become irrelevant measure. A more accurate argumentation for this behavior can be based on the fact that the Eurozone faced a problem with persistent low inflation. In many cases it was argued that Eurozone may be another similar case like Japan. Such results may justify the behavior to inflation, because when the observed-anticipated inflation seems to be low, a rise in inflation, may be perceived as a sign of the upcoming recovery. The more important finding to be underlined is that the response to the ESI seems to be repeating itself, apart from pre-crisis Netherlands sample which is composed of aberrations. In many cases during the in-crisis analysis the ESI seems to become less turbulent, without corrections and seems the relationship with the spread to become more of a long-run type. The importance for such a result is that it may be considered as evidence that sentiment influences the spreads or a t least, that ESI is well constructed as an index.

Finally, although the results can be considered as mixed, especially the result of Netherlands for the first period, there are evidence that the investor sentiment may play role as a determinant of a Euro group bond spreads that were investigated. Although the countries investigated are different, some results seem to be alike and are in favor of influence that sentiment has to the market. The important to the results, especially for the case of the ESI index, was that many of them repeat themselves over different samples. For sure, more investigation is needed in order for concrete results to be presented, but still, there may be truth in what behavioral economists are arguing.

Limitations

The limitations of this research is basically because of the method that was used. The VAR-VEC framework although flexible isn't based on any theory. In the specific case this worked as an advantage, because the sentiment theories are in a development phase, so the flexibility of this framework, helps the investigation. Another limitation was the sample. In order for the Baker-Wurgler index to be used, the sample was constrained to a range from 2005-2010. This issue created problems with the lag structure due the absence of observations. It seemed it may be better to include larger lag intervals in some cases and due to the problem that the range of the Baker index had, this could not happen. The lag structure in general is problematic as a concept because there is no objective criterion for the optimal lag structure (Brooks, 2008). On the other hand some tests that were conducted upon the whole sample, before the writing of this research, didn't produced any results of a clear lag structure, therefore, it is upon the researcher to decide, something that usually happens with the VAR framework. The observation for the behavior of the criteria is helpful somehow, but still, it isn't a perfect solution. Such researches need bigger amounts of data and it may be wise to be done in a broader scale. Also it may be better such an analysis to be based on the whole of the Eurozone's countries, but this is impossible to happen in the context of the specific research. Still it is good that during the analysis of 3 different countries, some interesting results seemed to be similar.

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