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ΣΧΟΛΗ ΚΟΙΝΩΝΙΚΩΝ ΕΠΙΣΤΗΜΩΝ  
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Στρατηγική Διοικητική Αντιπροσώπευση και  
Εταιρική Κοινωνική Ευθύνη σε Ολιγοπωλιακές Αγορές

Διατριβή που υποβλήθηκε για την μερική ικανοποίηση των απαιτήσεων  
για την απόκτηση Διδακτορικού Διπλώματος

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## ΣΥΝΟΨΗ ΔΙΔΑΚΤΟΡΙΚΗΣ ΔΙΑΤΡΙΒΗΣ

Η «Ορθόδοξη» οικονομική θεωρία εξετάζει τις επιχειρήσεις ως οικονομικές μονάδες, των οποίων ο κύριος στόχος είναι η μεγιστοποίηση των κερδών τους. Σύμφωνα με την παραπάνω θεώρηση, κάθε απόκλιση από στρατηγικές που ορίζονται στα πλαίσια της αυστηρής μεγιστοποίησης των κερδών αποτελεί ένδειξη για μη χρηστή λειτουργία της επιχείρησης. Παρόλα αυτά, σύγχρονα εμπειρικά δεδομένα αποδεικνύουν ότι πλέον, οι στρατηγικές των επιχειρήσεων συχνά αποκλίνουν από την αυστηρώς εννοούμενη μεγιστοποίηση των κερδών, με απώτερο σκοπό την επίτευξη ανταγωνιστικού πλεονεκτήματος σε σχέση με τους ανταγωνιστές τους στις αγορές που λειτουργούν. Σε αυτή την κατηγορία στρατηγικών εντάσσονται η *«Στρατηγική Διοικητική Αντιπροσώπηση»* και η *«Εταιρική Κοινωνική Ευθύνη»*. Ο σκοπός της παρούσας Διδακτορικής Διατριβής είναι η εξέταση των επιπτώσεων των προαναφερθεισών στρατηγικών τόσο στην απόδοση των επιχειρήσεων, όσο και στην κοινωνική ευημερία. Τα επιστημονικά εργαλεία που χρησιμοποιούνται στα πλαίσια της Οικονομικής Θεωρίας είναι η Θεωρία Παιγνίων και η Βιομηχανική Οργάνωση, έτσι ώστε να αναδειχθούν οι στρατηγικές αλληλεπιδράσεις που εμφανίζονται μεταξύ των επιχειρήσεων σε ολιγοπωλιακούς κλάδους.

Η πρώτη θεματική ενότητα της παρούσας Διατριβής επικεντρώνεται στη Στρατηγική Διοικητική Αντιπροσώπηση. Η βιβλιογραφία παρουσιάζει δυο, ως τα βασικά κίνητρα για την ανάθεση της ευθύνης ορισμένων αποφάσεων από τους ιδιοκτήτες των επιχειρήσεων προς τους διευθυντές τους. Το πρώτο είναι η ανάγκη των ιδιοκτητών να εκμεταλλευθούν συγκεκριμένες ικανότητες τις οποίες μπορεί να ενσωματώνουν ορισμένοι διευθυντές, έτσι ώστε να βελτιώσουν την απόδοση των επιχειρήσεών τους. Η σχετική βιβλιογραφία περιλαμβάνει την θεωρία Εντολέα-Εντολοδόχου, η οποία επικεντρώνεται στους τρόπους τους οποίους μπορεί να

χρησιμοποιήσει ο ιδιοκτήτης της επιχείρησης, ώστε να οδηγήσει τον διευθυντή του σε συμπεριφορά που μεγιστοποιεί το κέρδος της επιχείρησης, δηλαδή ταυτίζεται με την αντικειμενική συνάρτηση του ιδιοκτήτη. Το δεύτερο κίνητρο έχει να κάνει με την δυνατότητα αξιόπιστης δέσμευσης, μέσω των διευθυντών, σε στρατηγικές που οι ίδιοι οι ιδιοκτήτες διαφορετικά δεν μπορούν να εφαρμόσουν λόγω του γεγονότος ότι η αντικειμενική τους συνάρτηση ταυτίζεται αυστηρά με την μεγιστοποίηση των κερδών της επιχείρησης τους. Πιο συγκεκριμένα ο ιδιοκτήτης μιας επιχείρησης μπορεί να αποκτήσει στρατηγικό πλεονέκτημα έναντι των ανταγωνιστών του, προσλαμβάνοντας έναν διευθυντή του οποίου η αντικειμενική συνάρτηση αποκλίνει από την αυστηρή μεγιστοποίηση των κερδών. Αυτού του είδους η αντιπροσώπευση ορίζεται στην βιβλιογραφία ως Στρατηγική Διοικητική Αντιπροσώπευση.

Η δεύτερη θεματική ενότητα της παρούσας Διατριβής, εξειδικεύεται στην Εταιρική Κοινωνική Ευθύνη (ΕΚΕ). Αν και δεν υπάρχει ένας κοινά αποδεκτός ορισμός για την ΕΚΕ, ο πιο καθιερωμένος αναφέρεται στην ΕΚΕ ως: *«μια έννοια με την οποία οι εταιρείες ενσωματώνουν, σε εθελοντική βάση, κοινωνικές και περιβαλλοντικές ανησυχίες στις επιχειρηματικές τους δραστηριότητες και στις επαφές τους με άλλα ενδιαφερόμενα μέρη»* (European Commission, Green Paper, 2001). Η ανάλυση των επιπτώσεων της ΕΚΕ είναι πολύ σημαντική καθώς πρόσφατα εμπειρικά δεδομένα αποδεικνύουν ότι η ΕΚΕ απασχολεί σημαντικά τις σύγχρονες επιχειρήσεις. Πιο συγκεκριμένα, περισσότερες από τις μισές από τις 100 μεγαλύτερες επιχειρήσεις στις 16 πιο βιομηχανοποιημένες χώρες, δημοσίευσαν αναφορές σχετικά με τις δραστηριότητες τους σε ΕΚΕ το έτος 2005 (Becchetti και λοιποί, 2006).

Η παρούσα διατριβή αποτελείται από τέσσερα ξεχωριστά κεφάλαια.

## **Κεφάλαιο 1**

Το πρώτο κεφάλαιο αναφέρεται στην εξέταση του τύπου των αποφάσεων που στρατηγικά ανατίθενται από τους ιδιοκτήτες μιας ολιγοπωλιακής επιχείρησης

στους διευθυντές τους, στην ισορροπία. Αν και ο όρος εισήχθη στην οικονομική βιβλιογραφία από τον Schelling (1960), οι Vickers (1985), Fershtman & Judd (1987) και ο Sklivas (1987) (VFJS) δημιούργησαν το θεωρητικό υπόβαθρο σχετικά με την χρήση της στρατηγικής αντιπροσώπευσης για την δημιουργία προϋποθέσεων ανταγωνιστικού πλεονεκτήματος σε ολιγοπωλιακές αγορές. Πιο συγκεκριμένα σε ένα θεωρητικό πλαίσιο ανταγωνισμού σε ποσότητες, ο ιδιοκτήτης κάθε επιχείρησης έχει την δυνατότητα να προσλάβει έναν διευθυντή, να του αναθέσει τον ανταγωνισμό στην αγορά και να του προσφέρει ένα συμβόλαιο κινήτρου το οποίο θα τον οδηγήσει σε πιο επιθετική συμπεριφορά, σε σχέση με την αυστηρή μεγιστοποίηση των κερδών. Αναλυτικότερα εξετάζεται ένα παίγνιο δυο σταδίων. Στο πρώτο στάδιο οι ιδιοκτήτες της επιχείρησης, που είναι μεγιστοποιητές κέρδους, αποφασίζουν τις παράμετρους κινήτρου σε ένα εξωγενώς δεδομένο συμβόλαιο κινήτρου, το οποίο είναι γραμμικός συνδυασμός των κερδών και των πωλήσεων της επιχείρησής τους. Στο δεύτερο στάδιο, δεδομένου ότι οι όροι των συμβολαίων είναι κοινή γνώση, οι διευθυντές ανταγωνίζονται στην αγορά θέτοντας ποσότητες. Κάθε ιδιοκτήτης έχει την ευκαιρία να αποκτήσει ανταγωνιστικό πλεονέκτημα στην αγορά, δεδομένου ότι ο αντίπαλος ιδιοκτήτης δεν έχει επιλέξει την στρατηγική αντιπροσώπευση. Στην ισορροπία το αποτέλεσμα είναι ότι αμφότεροι οι ιδιοκτήτες επιλέγουν την στρατηγική αντιπροσώπευση, επομένως, οδηγούμαστε σε ένα δίλημμα του κρατουμένου λόγω του αυξημένου ανταγωνισμού μεταξύ των αντιπάλων επιχειρήσεων.

Το παραπάνω πλαίσιο, όμως, αγνοεί πως πέρα από τις βραχυπρόθεσμες αποφάσεις, όπως είναι ο καθορισμός του προϊόντος, υπάρχει και ένας άλλος τύπος αποφάσεων που αξίζει περαιτέρω προσοχή από τους ερευνητές. Αυτός είναι οι μακροχρόνιες αποφάσεις της επιχείρησης, όπως για παράδειγμα οι επενδύσεις σε έρευνα και ανάπτυξη. Ο σκοπός αυτού του κεφαλαίου είναι διττός.

Πρώτον, να εξετάσει τις στρατηγικές αλληλεπιδράσεις που δημιουργούνται μεταξύ των επιχειρήσεων, καθώς και την απόδοσή τους στην αγορά, όταν οι ιδιοκτήτες τους έχουν δύο εναλλακτικές στρατηγικές. Η πρώτη αναφέρεται στην Πλήρη Αντιπροσώπευση (ΠΑ), στην οποία οι ιδιοκτήτες αναθέτουν τόσο τις βραχυπρόθεσμες, όσο και τις μακροπρόθεσμες αποφάσεις στους διευθυντές, ενώ η δεύτερη αφορά την Μερική Αντιπροσώπευση (ΜΑ), σύμφωνα με την οποία οι ιδιοκτήτες αναθέτουν μόνο τις βραχυπρόθεσμες αποφάσεις στους διευθυντές τους. Το θεωρητικό πλαίσιο ανάλυσης περιλαμβάνει μια δυοπωλιακή αγορά στην οποία οι επιχειρήσεις ανταγωνίζονται σε ποσότητες (βραχυχρόνιες αποφάσεις) και σε επενδύσεις σε έρευνα και ανάπτυξη (μακροχρόνιες αποφάσεις). Τρία εναλλακτικά σενάρια διαμορφώνονται. Το πρώτο είναι η ολική Πλήρης Αντιπροσώπευση (ΠΑ, ΠΑ) στην οποία και οι δύο ιδιοκτήτες επιλέγουν ΠΑ. Σύμφωνα με το δεύτερο σενάριο της ολικής Μερικής Αντιπροσώπευσης και οι δύο ιδιοκτήτες επιλέγουν ΜΑ (ΜΑ, ΜΑ), ενώ το τρίτο σενάριο αναφέρεται στην ασύμμετρη περίπτωση της Συνύπαρξης των δύο στρατηγικών (ΠΑ, ΜΑ). Επικεντρώνοντας στα συμμετρικά σενάρια, τα αποτελέσματα δείχνουν πάντα μεγαλύτερες επενδύσεις σε έρευνα και ανάπτυξη στο σενάριο της ολικής Πλήρους Αντιπροσώπευσης σε σχέση με την ολική Μερική Αντιπροσώπευση. Αν το αρχικό οριακό κόστος είναι μικρό, τότε τα κέρδη είναι μεγαλύτερα στο σενάριο της ολικής Πλήρους αντιπροσώπευσης, ενώ το αντίστροφο ισχύει για μεγάλο αρχικό οριακό κόστος. Στο ασύμμετρο σενάριο, η επιχείρηση η οποία υιοθετήσει την ΠΑ πάντα επενδύει περισσότερο σε έρευνα και ανάπτυξη, και έχει μεγαλύτερα κέρδη συγκρινόμενη τόσο με την ανταγωνίστρια επιχείρηση, όσο και με τα δύο συμμετρικά σενάρια.

Δεύτερον, να αναζητήσει το σενάριο που θα επικρατήσει στην ισορροπία, υποθέτοντας ότι δεν υπάρχει δυνατότητα αξιόπιστης δέσμευσης μεταξύ των ιδιοκτητών των επιχειρήσεων σε σχέση με την στρατηγική που θα ακολουθήσουν. Πιο αναλυτικά, η σταθερότητα κάθε σεναρίου δοκιμάζεται, εξετάζοντας τα κίνητρα

των ιδιοκτητών να αποκλίνουν από την στρατηγική που αυτό υπαγορεύει. Τα αποτελέσματα δείχνουν ότι η ολική ΜΑ δεν είναι ποτέ ισορροπία. Αν το αρχικό οριακό κόστος είναι χαμηλό τότε το ασύμμετρο σενάριο είναι η μοναδική ισορροπία. Αντίθετα, η συμμετρική Πλήρης Αντιπροσώπευση αποτελεί το μοναδικό σενάριο ισορροπίας για υψηλό αρχικό οριακό κόστος. Όμως, αν υποθέσουμε ότι υπάρχει δυνατότητα αξιόπιστης δέσμευσης μεταξύ των ιδιοκτητών των επιχειρήσεων τότε η ολική ΠΑ είναι η μοναδική ισορροπία.

Το παρόν κεφάλαιο συνεισφέρει σε έναν πρόσφατο κλάδο της βιβλιογραφίας που ξεκίνησε από τους Zhang & Zhang (1997) και Z. Zhang (2002), οι οποίοι ήταν οι πρώτοι που εισήγαγαν την ανάθεση των μακροχρόνιων αποφάσεων στο μοντέλο VFJS. Σε μια αγορά με Cournot ανταγωνισμό, υποθέτουν ότι οι ιδιοκτήτες επιλέγουν εξωγενώς την Πλήρη Αντιπροσώπευση. Το κύριο εύρημα τους είναι ότι οι επιχειρήσεις, κάτω από πλήρη αντιπροσώπευση και για χαμηλά (υψηλά) επίπεδα διάχυσης της έρευνας και ανάπτυξης, επενδύουν περισσότερο (λιγότερο) σε έρευνα και ανάπτυξη και έχουν χαμηλότερα κέρδη σε σχέση με την Μη Αντιπροσώπευση, δηλαδή τον απλό Cournot ανταγωνισμό, χωρίς στρατηγική αντιπροσώπευση. Οι Kopel & Riegler (2005) ενδογενοποιούν την επιλογή των ιδιοκτητών ανάμεσα σε Μη και Πλήρη Αντιπροσώπευση, υποθέτοντας ότι υπάρχει αξιόπιστη δέσμευση μεταξύ τους σχετικά με την στρατηγική την οποία θα ακολουθήσουν. Αυτό που βρίσκουν είναι ότι η διάχυση της έρευνας και ανάπτυξης δεν επηρεάζει την στρατηγική ισορροπία των ιδιοκτητών η οποία είναι πάντοτε η Πλήρης Αντιπροσώπευση.

Τα παραπάνω άρθρα, όμως, δεν εξετάζουν την Μερική Αντιπροσώπευση ως πιθανή στρατηγική των ιδιοκτητών. Παρόλα αυτά, πρόσφατα εμπειρικά δεδομένα δείχνουν ότι οι ιδιοκτήτες των επιχειρήσεων προτιμούν να αναθέτουν μόνο τις βραχυπρόθεσμες αποφάσεις στους διευθυντές τους, ενώ αντίθετα κρατούν τις μακροπρόθεσμες αποφάσεις υπό τον έλεγχό τους. Οι Barcena-Ruiz & Casado-Izaga (2005), αναφέρουν ότι οι μελέτες περιπτώσεων των εταιριών B.M.W., Benetton και

Microsoft, δείχνουν αυτό ακριβώς, ήτοι οι ιδιοκτήτες των επιχειρήσεων αυτών αναθέτουν μόνο τις βραχυπρόθεσμες αποφάσεις στους διευθυντές τους. Επιπλέον, εμπειρικά αποτελέσματα από τους Colombo & Delmastro (2004) σε 400 μεγάλες ιταλικές επιχειρήσεις, επιβεβαιώνουν τα παραπάνω συμπεράσματα.

Οι Barcena-Ruiz & Casado-Izaga (2005), εξετάζουν τα κίνητρα των ιδιοκτητών να ακολουθήσουν Πλήρη ή Μερική Αντιπροσώπευση, σε μία διαφορετική κατηγορία αποφάσεων. Πιο συγκεκριμένα θεωρούν την οριζόντια διαφοροποίηση, ως την μακροπρόθεσμη απόφαση και τις τιμές ως την βραχυπρόθεσμη. Επιπλέον υποθέτουν ότι υπάρχει αξιόπιστη δέσμευση μεταξύ των ιδιοκτητών, σχετικά με την στρατηγική την οποία θα ακολουθήσουν. Το κύριο εύρημα τους είναι ότι στην ισορροπία, αμφότεροι οι ιδιοκτήτες θα επιλέξουν Μερική Αντιπροσώπευση. Αντίθετα, στο παρόν κεφάλαιο, αποδεικνύεται ότι όταν οι επιχειρήσεις ανταγωνίζονται στην αγορά σε στρατηγικά υποκατάστατες αποφάσεις (ποσότητα), και δεν υπάρχει αξιόπιστη δέσμευση μεταξύ των ιδιοκτητών, σχετικά με την στρατηγική την οποία θα ακολουθήσουν, τότε η Μερική Αντιπροσώπευση δεν είναι ποτέ στρατηγική ισορροπίας.

## **Κεφάλαιο 2**

Στο δεύτερο κεφάλαιο, αναλύεται ο βέλτιστος τύπος του συμβολαίου κινήτρου που θα επιλέξουν οι ιδιοκτήτες των επιχειρήσεων στην ισορροπία, ώστε να αμείψουν τους διευθυντές τους. Συμβόλαια κινήτρου που αποτελούν γραμμικό συνδυασμό των κερδών και των πωλήσεων της επιχείρησης, έχουν αναλυθεί εκτενώς από την βιβλιογραφία της Βιομηχανικής Οργάνωσης (βλέπε VFJS). Αντίθετα, άλλοι τύποι συμβολαίου, όπως η σχετική απόδοση της επιχείρησης σε σχέση με τους ανταγωνιστές της, έχουν λάβει λιγότερη προσοχή. Οι Miller & Pazgal (2001, 2002, 2005) σχηματοποιούν το θεωρητικό πλαίσιο, στο οποίο οι διευθυντές των επιχειρήσεων αμείβονται σύμφωνα με ένα συμβόλαιο κινήτρου το οποίο είναι ένας γραμμικός συνδυασμός των ιδίων κερδών της επιχείρησης και των κερδών της



αντίπαλης επιχείρησης (σχετική απόδοση). Το αποτέλεσμα ισορροπίας στο μοντέλο σχετικής απόδοσης είναι αντίστοιχο με αυτό του μοντέλου VFJS (συμβόλαιο κερδών-πωλήσεων).

Πιο συγκεκριμένα, το παρόν κεφάλαιο εξετάζει τόσο θεωρητικά, όσο και πειραματικά ένα ολιγοπωλιακό μοντέλο στο οποίο οι ιδιοκτήτες των επιχειρήσεων επιλέγουν ενδογενώς τον τύπο του συμβολαίου κινήτρου που θα ανακοινώσουν στον διευθυντή τους. Οι εναλλακτικές επιλογές είναι το συμβόλαιο σχετικής απόδοσης και αυτό των κερδών-πωλήσεων. Ειδικότερα, οι ιδιοκτήτες επιλέγουν τόσο τον τύπο τον συμβολαίου, όσο και τους όρους του, οι οποίοι καθορίζουν την επιθετικότητα των διευθυντών τους. Τα θεωρητικά αποτελέσματα δείχνουν ότι οι ιδιοκτήτες των επιχειρήσεων θα επιλέξουν συμβόλαια κινήτρου σχετικής απόδοσης στην ισορροπία.

Το άρθρο των Huck και λοιπών (2004), είναι η μοναδική προηγούμενη πειραματική εργασία σχετική με την στρατηγική διοικητική αντιπροσώπευση. Ο σχεδιασμός του πειράματος τους περιορίζεται μόνο στα συμβόλαια κερδών-πωλήσεων. Έτσι το παρόν πείραμα είναι το πρώτο που περιλαμβάνει την ενδογενή επιλογή μεταξύ εναλλακτικών τύπων συμβολαίων κινήτρου, πριν την επιλογή των όρων του συμβολαίου (επιθετικότητα). Επιπρόσθετα, αντίθετα με τους Huck και λοιπούς (2004) οι οποίοι υποθέτουν ένα διακριτό χώρο επιλογών σε σχέση με τους όρους του συμβολαίου, στο παρόν πείραμα οι επιλογές των ιδιοκτητών είναι συνεχείς.

Τα αποτελέσματα του θεωρητικού μέρους του κεφαλαίου, αποτελούν τις υποθέσεις που ελέγχονται από το πείραμα. Τα πειραματικά δεδομένα επιβεβαιώνουν ορισμένες θεωρητικές προβλέψεις, ενώ άλλες απορρίπτονται. Πρώτον, η επικράτηση των συμβολαίων σχετικής απόδοσης, έναντι των αντίστοιχων κερδών-πωλήσεων, επιβεβαιώνεται. Παρόλα αυτά, η πειραματική προσέγγιση κατορθώνει να διαχωρίσει τους λόγους για τους οποίους συμβαίνει

αυτό. Ήτοι, η επικέντρωση σε ισορροπίες που είναι ανώτερες κατά Pareto φαίνεται να εξηγεί καλύτερα το παραπάνω αποτέλεσμα σε σχέση με την δυνατότητα αξιόπιστης δέσμευσης, ως προς την ακολουθούμενη στρατηγική. Δεύτερον, παρατηρείται ότι οι ιδιοκτήτες επιλέγουν πιο επιθετικούς όρους στα συμβόλαια κινήτρου σχετικής απόδοσης. Το εύρημα αυτό επιβεβαιώνει μόνο το ασύμμετρο σενάριο του θεωρητικού μοντέλου. Τέλος οι θεωρητικές προβλέψεις σχετικά με την συναρτησιακή σχέση μεταξύ προϊόντος και τύπου συμβολαίων δεν επιβεβαιώνεται, ενώ η αντίστοιχη σχέση με τους όρους επιθετικότητας μπορεί να τεκμηριωθεί σε ορισμένες περιπτώσεις.

Εξετάζοντας κανείς λεπτομερώς τα αποτελέσματα του παρόντος κεφαλαίου, θα διαπιστώσει και τον λόγο για τον οποίο διαφέρουν τα αποτελέσματα μεταξύ της θεωρητικής και της πειραματικής προσέγγισης στην στρατηγική αντιπροσώπηση. Αυτός δεν είναι άλλος από το γεγονός, ότι η θεωρητική προσέγγιση αγνοεί κάποιες παραμέτρους που έχουν να κάνουν με την συμπεριφορά των ατόμων. Το παρόν κεφάλαιο, χρησιμοποιεί την πειραματική οικονομική, ώστε να προσθέσει και άλλες ερμηνευτικές παραμέτρους στην βιβλιογραφία της στρατηγικής αντιπροσώπησης και πιο συγκεκριμένα την δυνατότητα αντίδρασης των διευθυντών στους όρους των συμβολαίων κινήτρων που δέχονται από τους ιδιοκτήτες.

### **Κεφάλαιο 3**

Το τρίτο κεφάλαιο εξετάζει τα κίνητρα των ιδιοκτητών ολιγοπωλιακών επιχειρήσεων να εμπλακούν σε δραστηριότητες Εταιρικής Κοινωνικής Ευθύνης (ΕΚΕ). Αυτό το κεφάλαιο εντάσσεται στην γενικότερη συζήτηση μεταξύ των οικονομολόγων σχετικά με τις επιπτώσεις της ΕΚΕ, τόσο στην κερδοφορία των επιχειρήσεων, όσο και στην συνολική κοινωνική ευημερία. Η συζήτηση αυτή ξεκινά λόγω της ραγδαίας εξέλιξης επιχειρήσεων όπως για παράδειγμα η "The Body Shop", των οποίων τα προϊόντα είναι στενά συνδεδεμένα με περιβαλλοντικές και κοινωνικές ανησυχίες. Επιπρόσθετα, πρόσφατα εμπειρικά δεδομένα τεκμηριώνουν

την προσπάθεια πολλών σύγχρονων επιχειρήσεων να είναι, ή τουλάχιστον να φαίνονται κοινωνικά υπεύθυνες (βλέπε Becchetti και λοιποί, 2006).

Δεδομένων των παραπάνω, το κύριο ερώτημα που προκύπτει είναι το εξής: *«Για ποιο λόγο ο ιδιοκτήτης μιας ιδιωτικής επιχείρησης να είναι πρόθυμος να δημιουργήσει κόστος, ώστε να χρηματοδοτήσει ενέργειες οι οποίες προωθούν κοινωνικές αξίες;»*. Το παρόν κεφάλαιο προσπαθεί να απαντήσει σε αυτό το ερώτημα, θεωρώντας μια ολιγοπωλιακή αγορά, στην οποία οι ιδιοκτήτες των επιχειρήσεων μπορούν να αναθέσουν τις αποφάσεις για εμπλοκή σε ενέργειες ΕΚΕ και τον ανταγωνισμό στην αγορά σε «Κοινωνικά Υπεύθυνους» διευθυντές, ενώ οι καταναλωτές διαφέρουν ως προς την προθυμία τους να πληρώσουν περισσότερο για το τελικό προϊόν των επιχειρήσεων που εμπλέκονται σε ΕΚΕ.

Πιο αναλυτικά η βασική ιδέα είναι ότι οι επιχειρήσεις εμπλέκονται στρατηγικά σε ΕΚΕ, ώστε να δημιουργήσουν μια «κοινωνικά φιλική» εικόνα για το προϊόν τους. Οι καταναλωτές θεωρούνται ως ομοιογενείς στις προτιμήσεις τους σε σχέση με τα φυσικά χαρακτηριστικά των τελικών προϊόντων, αλλά ως ετερογενείς σε σχέση με το πώς αξιολογούν τις ενέργειες ΕΚΕ των επιχειρήσεων που τα παράγουν. Όσο περισσότερο κοινωνικά ευαισθητοποιημένος είναι ένας καταναλωτής, τόσο αυξάνεται η διάθεση του να πληρώσει περισσότερο για το προϊόν της εταιρίας που πιστεύει ότι είναι κοινωνικά υπεύθυνη. Όμως, η εμπλοκή των επιχειρήσεων σε ΕΚΕ, απαιτεί συχνά κοστοβόρες ενέργειες από πλευράς τους, ώστε να λειτουργήσουν προς όφελος των κοινωνικών τους εταίρων. Τέτοιες ενέργειες μπορεί να περιλαμβάνουν την βελτίωση των συνθηκών ασφαλείας των εργαζομένων, την παραγγελία πρώτων υλών από τοπικούς προμηθευτές, ώστε να ενισχυθεί η τοπική οικονομία, ή την υιοθέτηση «πράσινων» τεχνολογιών που δεν επιβαρύνουν το περιβάλλον.

Η συνάρτηση χρησιμότητας των καταναλωτών που χρησιμοποιείται εδώ, συνδυάζει την οριζόντια με την κάθετη διαφοροποίηση των τελικών προϊόντων

ακολουθώντας τον Häckner (2000). Η κάθετη διαφοροποίηση αντιστοιχεί στις ενέργειες ΕΚΕ που μπορεί να ενσωματώνει ένα προϊόν, το οποίο εκλαμβάνεται ως βελτίωση της ποιότητάς του, από τους κοινωνικά ευαισθητοποιημένους καταναλωτές. Σε αυτό το θεωρητικό πλαίσιο, οι ιδιοκτήτες των επιχειρήσεων έχουν δύο εναλλακτικές στρατηγικές: είτε να μεταθέσουν τις αποφάσεις που αφορούν την ΕΚΕ και τον ανταγωνισμό στην αγορά σε ένα «Κοινωνικά Υπεύθυνο» διευθυντή, είτε όχι. Αυτό αντικατοπτρίζει μια συνηθισμένη πρακτική στις σύγχρονες επιχειρήσεις, η οποία περιλαμβάνει την πρόσληψη εξειδικευμένων διευθυντών με ισχυρό υπόβαθρο στην διαχείριση δραστηριοτήτων ΕΚΕ, καθώς και την ανάθεση σε αυτούς των αποφάσεων σε θέματα που άπτονται τόσο της ΕΚΕ, όσο και της γενικότερης λειτουργίας της επιχείρησης. Αυτή η ανάθεση δραστηριοτήτων δεν είναι τίποτα άλλο παρά ένα δείγμα των προθέσεων της επιχείρησης σχετικά με την ΕΚΕ, το οποίο θεωρείται αξιόπιστο από τους καταναλωτές. Στην παρούσα ανάλυση, η μη πρόσληψη «Κοινωνικά Υπεύθυνου» διευθυντή, σημαίνει ότι οι καταναλωτές δεν θεωρούν αξιόπιστη την δέσμευση της επιχείρησης σε ΕΚΕ και έτσι δεν προτίθενται να πληρώσουν περισσότερο για το προϊόν της.

Ακολουθώντας τους Miller & Pazgal (2001; 2002; 2005), γίνεται η υπόθεση ότι οι εν δυνάμει διευθυντές διακρίνονται από ένα εύρος στάσεων έναντι της ΕΚΕ, η οποία καθορίζει τον τύπο τους. Κάθε διευθυντής έχει μια συνάρτηση χρησιμότητας η οποία είναι γραμμικός συνδυασμός των κερδών της επιχείρησης και επιπλέον από την χρησιμότητα που απολαμβάνει λόγω της κοινωνικής προσφοράς του. Το κεντρικό σημείο της ανάλυσης εδώ είναι ότι κάθε διευθυντής δεσμεύεται σε μια συγκεκριμένη στάση έναντι της ΕΚΕ και όποιος ιδιοκτήτης τον προσλάβει, δεσμεύεται στην ίδια στάση έναντι στην ΕΚΕ.

Εξετάζονται τρία εναλλακτικά σενάρια. Το πρώτο είναι το συμμετρικό ΕΚΕ, το οποίο αναφέρεται στην περίπτωση που και οι δύο ιδιοκτήτες προσλαμβάνουν «Κοινωνικά Υπεύθυνο» διευθυντή, επομένως αναλαμβάνουν δραστηριότητες ΕΚΕ.

Το δεύτερο αντιστοιχεί στην ασύμμετρη περίπτωση, όπου μόνο ο ένας ιδιοκτήτης εμπλέκεται σε ΕΚΕ, ενώ στο τρίτο σενάριο, κανείς από τους ιδιοκτήτες δεν εμπλέκεται σε ΕΚΕ. Το κύριο εύρημα είναι ότι στην ισορροπία καθένας από τους ιδιοκτήτες θα προσλάβει έναν «Κοινωνικά Υπεύθυνο» διευθυντή, γιατί με αυτό τον τρόπο μπορεί να αυξήσει την κερδοφορία της επιχείρησης του μέσω της απόκτησης στρατηγικού πλεονεκτήματος στην αγορά. Αυτή η αλληλεπίδραση μεταξύ των ανταγωνιστών ιδιοκτητών είναι που τους οδηγεί να προσλάβουν έναν διευθυντή που δεσμεύεται ότι θα εμπλακεί σε ΕΚΕ.

Επομένως το πρώτο σενάριο είναι η μοναδική προκύπτουσα ισορροπία. Κάθε μονομερής απόκλιση ενός εκ των ιδιοκτητών από αυτή την ισορροπία, θα οδηγούσε την επιχείρησή του σε λιγότερα κέρδη σε σχέση με το καθεστώς ισορροπίας. Αυτό, γιατί τόσο το προϊόν, όσο και τα κέρδη κάθε επιχείρησης που αναλαμβάνει ενέργειες ΕΚΕ, είναι αυξημένα σε σχέση με την στρατηγική της μη εμπλοκής σε ΕΚΕ. Επίσης η στρατηγική εμπλοκή των επιχειρήσεων σε ΕΚΕ οδηγεί σε αύξηση του πλεονάσματος των καταναλωτών και της κοινωνικής ευημερίας.

Το παρόν κεφάλαιο συνεισφέρει στην υπάρχουσα βιβλιογραφία σχετικά με την «Στρατηγική ΕΚΕ», όρο που εισήχθη στην βιβλιογραφία από τον Baron (2001) και αναφέρεται στην περίπτωση όπου μια επιχείρηση εμπλέκεται σε ΕΚΕ προκειμένου να αποκομίσει κάποιο όφελος από την κίνηση αυτή. Οι Bagnoli & Watts (2003), περιγράφουν την περίπτωση όπου μια ολιγοπωλιακή επιχείρηση συνδέει την παροχή ενός δημόσιου αγαθού (ΕΚΕ) με την παροχή του ιδιωτικού προϊόντος της, στο θεωρητικό πλαίσιο των μοναδιαίων ζητήσεων και των ομοιογενών προτιμήσεων των καταναλωτών για ΕΚΕ. Το κύριο εύρημα τους είναι ότι η εμπλοκή των επιχειρήσεων σε ΕΚΕ είναι θετικά συνδεδεμένη με την πρόθεση των καταναλωτών να πληρώσουν περισσότερο για προϊόντα συνδεδεμένα με ΕΚΕ, αλλά αρνητικά συνδεδεμένη με την ένταση του ανταγωνισμού στον κλάδο. Αντίθετα, οι θεωρητικές υποθέσεις στο παρόν κεφάλαιο περιλαμβάνουν ετερογενείς

προτιμήσεις καταναλωτών ως προς ΕΚΕ και δυνατότητα αγοράς κυμαινόμενης ποσότητας και από τα δύο προϊόντα. Πιο πρόσφατα, ο Baron (2008), σε ένα θεωρητικό πλαίσιο Εντολέα–Εντολοδόχου, καταλήγει ότι ο ιδιοκτήτης μιας επιχείρησης θα συμπεριλάβει κοινωνικές συνιστώσες στην αμοιβή του διευθυντή του, μόνο στην περίπτωση που υπάρχει θετική ανταπόκριση από τους καταναλωτές και τους εν δυνάμει επενδυτές για δραστηριότητες ΕΚΕ. Αντίθετα όμως με το παρόν κεφάλαιο, δεν εξετάζει τις στρατηγικές αλληλεπιδράσεις που αναπτύσσονται ανάμεσα στις επιχειρήσεις σε ατελώς ανταγωνιστικές αγορές.

Το παρόν κεφάλαιο, όπως και το επόμενο, συνεισφέρουν σε έναν ακόμη κλάδο της βιβλιογραφίας που έχει να κάνει με την διαφοροποίηση των ολιγοπωλιακών επιχειρήσεων ως προς την ποιότητα. Η συντριπτική πλειοψηφία της εν λόγω βιβλιογραφίας είναι βασισμένη στην εργασία των Gabszewich & Thisse (1979) που υποθέτει ότι τα προϊόντα διαφοροποιούνται μόνο ως προς την κάθετη διάσταση η οποία είναι παρατηρήσιμη από τους καταναλωτές. Επίσης το κόστος αύξησης της ποιότητας υποτίθεται ότι είναι σταθερό, ή μηδενικό. Το παρόν κεφάλαιο υποθέτει ότι τα προϊόντα διαφοροποιούνται τόσο κάθετα όσο και οριζόντια. Επίσης οι καταναλωτές δεν μπορούν να παρατηρήσουν τα ποιοτικά χαρακτηριστικά των προϊόντων, αλλά βασίζονται στις πεποιθήσεις που σχηματίζουν βάσει των παρατηρήσιμων ενεργειών των επιχειρήσεων. Τέλος στο παρόν κεφάλαιο γίνεται η υπόθεση ότι η αύξηση της ποιότητας επηρεάζει το μεταβλητό κόστος της επιχείρησης.

#### **Κεφάλαιο 4**

Το τελευταίο κεφάλαιο εξετάζει τις συνθήκες κάτω από τις οποίες ο Κοινωνικός Σχεδιαστής μπορεί να ενισχύσει την ανάληψη ενεργειών ΕΚΕ από τις επιχειρήσεις σε μια ολιγοπωλιακή αγορά. Σύμφωνα με τους Porter και Kramer (2006), το κυριότερο όφελος των επιχειρήσεων από την εμπλοκή σε ΕΚΕ, είναι η ενίσχυση της φήμης τους, ιδιαίτερα στους καταναλωτές οι οποίοι είναι

ευαισθητοποιημένοι κοινωνικά. Όμως για να ενεργοποιηθεί το όφελος αυτό, θα πρέπει οι επιχειρήσεις να πείσουν τους δυνητικούς καταναλωτές σχετικά με την ευαισθητοποίησή τους σε θέματα ΕΚΕ. Επιπρόσθετα, η ανάληψη προσπαθειών ΕΚΕ, περιλαμβάνει ενέργειες μέσα στην αξιακή αλυσίδα των επιχειρήσεων, οι οποίες συχνά είναι δύσκολο, αν όχι αδύνατο να είναι παρατηρήσιμες από τους καταναλωτές. Για παράδειγμα η συντριπτική πλειοψηφία των καταναλωτών δεν μπορεί να ελέγξει αν πράγματι οι επιχειρήσεις χρησιμοποιούν φιλική προς το περιβάλλον τεχνολογία στην παραγωγή. Επομένως, με την απουσία ενός αξιόπιστου συστήματος πληροφόρησης προς τους καταναλωτές, οι επιχειρήσεις δεν θα καταφέρουν να πείσουν τους καταναλωτές για τον προσανατολισμό τους προς την ΕΚΕ. Κάτω από αυτές τις συνθήκες οι επιχειρήσεις δεν θα έχουν όφελος από την ανάληψη ενεργειών ΕΚΕ, επομένως δεν θα επενδύσουν σε μια τέτοια δραστηριότητα.

Το κύριο ερώτημα που προσπαθεί να απαντήσει το παρόν κεφάλαιο είναι το εξής: *«Ποια είναι τα μέτρα πολιτικής που μπορεί να εφαρμόσει ο κεντρικός σχεδιαστής, ούτως ώστε να προωθήσει την ανάληψη ενεργειών ΕΚΕ, και ποιες είναι οι επιπτώσεις τους στην αγορά και την κοινωνική ευημερία;»*. Ακολουθώντας το προηγούμενο, το παρόν κεφάλαιο προσπαθεί να απαντήσει σε αυτό το ερώτημα, θεωρώντας μια ολιγοπωλιακή αγορά, στην οποία οι επιχειρήσεις εμπλέκονται στρατηγικά σε ΕΚΕ, ώστε να δημιουργήσουν μια «κοινωνικά φιλική» εικόνα για το προϊόν τους. Οι καταναλωτές θεωρούνται ως ομοιογενείς στις προτιμήσεις τους σε σχέση με τα φυσικά χαρακτηριστικά των τελικών προϊόντων, αλλά ως ετερογενείς σε σχέση με το πώς αξιολογούν τις ενέργειες ΕΚΕ των επιχειρήσεων που τα παράγουν.

Εφόσον η ΕΚΕ μπορεί να ορισθεί ως *«δέσμευση των επιχειρήσεων σε κοινωνικές και περιβαλλοντικές αξίες πέρα και πάνω από τις απαιτήσεις των νόμων»* (European Commission, 2001), δεν είναι δυνατό να προταθούν μέτρα

οικονομικής πολιτικής που να περιλαμβάνουν την υποχρεωτική εφαρμογή ΕΚΕ από τις επιχειρήσεις. Επομένως, ως μέτρο πολιτικής προτείνεται η πιστοποίηση όσων επιχειρήσεων εμπλέκονται σε δραστηριότητες ΕΚΕ, εφόσον το επιθυμούν. Ακολουθώντας τους Bottega & De Freitas (2006), θεωρείται ότι η πιστοποίηση είναι ένα αποτελεσματικό σύστημα το οποίο παρέχει όλη την απαραίτητη πληροφόρηση σχετικά με τις πρακτικές ΕΚΕ που εφάρμοσαν οι επιχειρήσεις, των οποίων το τελικό προϊόν αγοράζουν ή όχι οι καταναλωτές.

Δύο εναλλακτικά σενάρια εξετάζονται. Το πρώτο περιλαμβάνει την θέσπιση κριτηρίων και την παροχή πιστοποίησης σε επιχειρήσεις σχετικά με ενέργειες τους σε ΕΚΕ, από έναν ιδιωτικό οργανισμό ο οποίος έχει ως στόχο την μεγιστοποίηση των κερδών του, χωρίς την παρέμβαση του κοινωνικού σχεδιαστή. Το κυριότερο εύρημα είναι ότι οι επιχειρήσεις στην ισορροπία θα επιλέξουν να εμπλακούν σε ΕΚΕ και επομένως να πιστοποιηθούν από τον ιδιωτικό οργανισμό. Ο λόγος για αυτή τους την επιλογή δεν είναι άλλος παρά η επιδίωξη στρατηγικού πλεονεκτήματος στην αγορά στην οποία λειτουργούν, λόγω της προθυμίας των κοινωνικά ευαισθητοποιημένων καταναλωτών, να πληρώσουν περισσότερα για το προϊόν της επιχείρησης που εμπλέκεται σε ΕΚΕ. Αυτή η αλληλεπίδραση μεταξύ των ανταγωνιστριών επιχειρήσεων, οδηγεί σε αύξηση του πλεονάσματος των καταναλωτών και της συνολικής κοινωνικής ευημερίας, σε σύγκριση με την περίπτωση όπου καμιά επιχείρηση δεν εμπλέκεται σε ΕΚΕ.

Το δεύτερο σενάριο έχει να κάνει με την θέσπιση κριτηρίων και παροχή πιστοποίησης σχετικά με τις δραστηριότητες ΕΚΕ των επιχειρήσεων από τον κοινωνικό σχεδιαστή, ώστε να καλύψει τυχόν πληροφοριακό κενό των καταναλωτών. Η βασική διαφορά με το προηγούμενο σενάριο είναι ότι ο κοινωνικός σχεδιαστής, όταν θέτει το επίπεδο ΕΚΕ προς πιστοποίηση, μεγιστοποιεί την κοινωνική ευημερία. Το κύριο εύρημα είναι ότι ο κοινωνικός σχεδιαστής θα θέσει εκείνο το επίπεδο δραστηριοτήτων ΕΚΕ, ώστε να είναι βέλτιστη επιλογή κάθε



επιχείρησης η εμπλοκή σε ΕΚΕ και η πιστοποίησή της. Το επίπεδο ΕΚΕ προς πιστοποίηση κάτω από το παρόν σενάριο, είναι πάντα μεγαλύτερο από το αντίστοιχο σενάριο της πιστοποίησης από τον ιδιωτικό φορέα. Επομένως το πλεόνασμα των καταναλωτών, και η κοινωνική ευημερία που παράγεται είναι ακόμα υψηλότερη κάτω από την πιστοποίηση από τον κοινωνικό σχεδιαστή, παρά από τον ιδιωτικό φορέα και το σενάριο όπου καμιά επιχείρηση δεν εμπλέκεται σε ΕΚΕ.

Το παρόν κεφάλαιο, όπως το προηγούμενο συνεισφέρουν στην βιβλιογραφία σχετικά με την διαφοροποίηση των ολιγοπωλιακών επιχειρήσεων ως προς την ποιότητα των προϊόντων που παρέχουν. Επιπρόσθετα, εντάσσεται σε ένα νέο κλάδο της βιβλιογραφίας, που έχει να κάνει με την εξέταση εναλλακτικών καθεστώτων πιστοποίησης σε προϊόντα, των οποίων η ποιότητα δεν είναι εύκολα παρατηρήσιμη από τους καταναλωτές. Οι Bottega & De Freitas (2006) εξετάζουν τις επιπτώσεις μεταξύ της πιστοποίησης «πράσινων» προϊόντων από έναν ιδιωτικό φορέα πιστοποίησης και τον κοινωνικό σχεδιαστή, σε ένα μονοπωλιακό θεωρητικό πλαίσιο. Οι Bonroy & Constantatos (2008) επικεντρώνονται στην διαφορά ανάμεσα στην υποχρεωτική και την εθελοντική πιστοποίηση προϊόντων των οποίων η ποιότητα δεν είναι εύκολα παρατηρήσιμη από τους καταναλωτές, σε ένα ολιγοπωλιακό περιβάλλον και ανταγωνισμό σε τιμές. Το παρόν κεφάλαιο επικεντρώνεται σε μια ολιγοπωλιακή αγορά, όπου οι επιχειρήσεις ανταγωνίζονται σε ποσότητες. Μέσα σε αυτό το πλαίσιο εξετάζει την διαφορά ανάμεσα στην παροχή της πιστοποίησης από ιδιωτικό φορέα ή τον κοινωνικό σχεδιαστή, υποθέτοντας ότι η πιστοποίηση είναι εθελοντική.

Επίσης, το παρόν κεφάλαιο, όπως και το προηγούμενο, εντάσσεται σε ένα κλάδο της βιβλιογραφίας που είναι γνωστός ως «Στρατηγική ΕΚΕ». Ο Baron (2001, 2003) ερευνά την διαφορά της παροχής κοινωνικών αξιών από τον δημόσιο (μέσω της κοινωνικής πολιτικής) ή τον ιδιωτικό τομέα. Αυτό που βρίσκει είναι ότι μια

επιχείρηση μπορεί να χρησιμοποιήσει την ΕΚΕ ώστε να μεταβάλει την στρατηγική της θέση σε μια αγορά, αποφεύγοντας πιθανό μποϊκοτάζ των προϊόντων της από τους κοινωνικά ευαίσθητοποιημένους καταναλωτές. Σε παρόμοιο θεματικό πεδίο οι Calveras και λοιποί (2006), σε μια τέλεια ανταγωνιστική αγορά, συγκρίνουν το σενάριο όπου ο κοινωνικός σχεδιαστής επιβάλλει ορισμένα επίπεδα ΕΚΕ, με την περίπτωση που οι επιχειρήσεις καταφεύγουν σε ΕΚΕ, ώστε να επωφεληθούν από την αντίδραση των κοινωνικά ευαίσθητοποιημένων καταναλωτών. Αυτό που βρίσκουν είναι ότι η υποκατάσταση της ρύθμισης από τον κοινωνικό σχεδιαστή με την παροχή ΕΚΕ από τις επιχειρήσεις, λειτουργεί τελικά προς όφελος των μη κοινωνικά ευαίσθητοποιημένων καταναλωτών. Οι τελευταίοι ωφελούνται από την προθυμία των κοινωνικά ευαίσθητοποιημένων καταναλωτών να πληρώσουν περισσότερο για τα προϊόντα των επιχειρήσεων που εμπλέκονται σε ΕΚΕ. Αυτό γίνεται μέσω της δυνατότητας παροχής φθηνότερων προϊόντων από άλλες επιχειρήσεις που δεν πληρώνουν για ΕΚΕ. Επομένως η έως τώρα βιβλιογραφία, επικεντρώνεται στην διαφορά ανάμεσα στην παροχή ΕΚΕ από τις ιδιωτικές επιχειρήσεις και την επιβολή ρύθμισης από τον κοινωνικό σχεδιαστή που να επιβάλλει ορισμένα επίπεδα ΕΚΕ από τις επιχειρήσεις. Αντίθετα το παρόν κεφάλαιο αναζητά τους τρόπους με τους οποίους μπορεί ο κοινωνικός σχεδιαστής να ενισχύσει την παροχή ΕΚΕ από τις ιδιωτικές επιχειρήσεις.

#### **Επίλογος – Θέματα για μελλοντική διερεύνηση.**

Συνοψίζοντας, παρατίθενται τα κύρια ερωτήματα που εξετάζονται στα παραπάνω κεφάλαια. Έτσι, στο πρώτο κεφάλαιο, ερευνάται ο βέλτιστος τύπος αποφάσεων (Πλήρης ή Μερική Αντιπροσώπευση), που θα αναθέσουν οι ιδιοκτήτες των επιχειρήσεων στους διευθυντές τους. Το κύριο εύρημα είναι ότι, αν το αρχικό οριακό κόστος είναι χαμηλό, τότε το ασύμμετρο σενάριο όπου ο ένας ιδιοκτήτης χρησιμοποιεί την Μερική Αντιπροσώπευση, ενώ ο άλλος την Πλήρη Αντιπροσώπευση είναι η μοναδική ισορροπία. Αντίθετα για υψηλό αρχικό οριακό

κόστος η ολική Πλήρης Αντιπροσώπευση είναι η μοναδική ισορροπία. Όμως, αν υποθέσουμε ότι υπάρχει δυνατότητα αξιόπιστης δέσμευσης μεταξύ των ιδιοκτητών των επιχειρήσεων, τότε η ολική Πλήρης Αντιπροσώπευση είναι η μοναδική ισορροπία.

Το δεύτερο κεφάλαιο αναλύει τον βέλτιστο τύπο συμβολαίου που θα χρησιμοποιήσουν οι ιδιοκτήτες των επιχειρήσεων, προς αμοιβή των διευθυντών τους, σε θεωρητικό και σε πειραματικό επίπεδο. Το κύριο εύρημα είναι η επικράτηση των συμβολαίων σχετικής απόδοσης σε σχέση με αυτά των κερδών-πωλήσεων, τόσο στην θεωρητική, όσο και στην πειραματική ανάλυση. Παρόλα αυτά δεν επιβεβαιώνονται όλες οι θεωρητικές προβλέψεις από τα πειραματικά δεδομένα, καθώς η θεωρητική προσέγγιση αγνοεί κάποιες παραμέτρους της ανθρώπινης συμπεριφοράς.

Το τρίτο κεφάλαιο, εξετάζει τα κίνητρα των ιδιοκτητών των επιχειρήσεων να εμπλακούν σε ενέργειες Εταιρικής Κοινωνικής Ευθύνης σε ολιγοπωλιακές αγορές. Οι ιδιοκτήτες των επιχειρήσεων έχουν δύο εναλλακτικές στρατηγικές: είτε να μεταθέσουν τις αποφάσεις που αφορούν την ΕΚΕ και τον ανταγωνισμό στην αγορά σε ένα «Κοινωνικά Υπεύθυνο» διευθυντή, είτε όχι. Αυτή η ανάθεση δραστηριοτήτων δεν είναι τίποτα άλλο παρά ένα δείγμα των προθέσεων της επιχείρησης σχετικά με την ΕΚΕ, το οποίο θεωρείται αξιόπιστο από τους καταναλωτές. Το κύριο εύρημα είναι ότι στην ισορροπία καθένας από τους ιδιοκτήτες θα προσλάβει έναν «Κοινωνικά Υπεύθυνο» διευθυντή, γιατί με αυτό τον τρόπο μπορεί να αυξήσει την κερδοφορία της επιχείρησης του μέσω της απόκτησης στρατηγικού πλεονεκτήματος στην αγορά.

Στο τελευταίο κεφάλαιο, εξετάζονται οι συνθήκες κάτω από τις οποίες ο Κοινωνικός Σχεδιαστής μπορεί να ενισχύσει την ανάληψη ενεργειών ΕΚΕ από τις επιχειρήσεις σε μια ολιγοπωλιακή αγορά. Δύο εναλλακτικά σενάρια αναλύονται. Το πρώτο περιλαμβάνει την θέσπιση κριτηρίων και την παροχή πιστοποίησης σε

επιχειρήσεις σχετικά με ενέργειες τους σε ΕΚΕ, από έναν ιδιωτικό οργανισμό ο οποίος έχει ως στόχο την μεγιστοποίηση των κερδών του, ενώ το δεύτερο περιλαμβάνει την παρέμβαση του κοινωνικού σχεδιαστή ως φορέα καθορισμού των κριτηρίων και πιστοποίησης. Το βασικό εύρημα είναι, ότι επίπεδο ΕΚΕ προς πιστοποίηση κάτω από το δεύτερο σενάριο, είναι πάντα μεγαλύτερο από το αντίστοιχο σενάριο της πιστοποίησης από τον ιδιωτικό φορέα, αλλά τέτοιο ώστε όλες οι επιχειρήσεις να θεωρούν ως βέλτιστη επιλογή την συμμετοχή τους σε ενέργειες ΕΚΕ. Επομένως το πλεόνασμα των καταναλωτών, και η κοινωνική ευημερία που παράγεται είναι ακόμα υψηλότερη κάτω από την πιστοποίηση από τον κοινωνικό σχεδιαστή, παρά από τον ιδιωτικό φορέα, καθώς και από το σενάριο όπου καμιά επιχείρηση δεν εμπλέκεται σε ΕΚΕ, ελλείψει αξιόπιστης πληροφόρησης προς τους καταναλωτές, σχετικά με τις δραστηριότητες ΕΚΕ των επιχειρήσεων.

Κλείνοντας, είναι χρήσιμο να προταθούν ορισμένες προεκτάσεις προς μελλοντική έρευνα που προκύπτουν από την παρούσα Διατριβή. Πιο αναλυτικά, στο πρώτο κεφάλαιο, θα ήταν χρήσιμο να διερευνηθεί η πιθανότητα αλλαγής των αποτελεσμάτων, αν η ανάλυση διεξαχθεί με διαφορετικού τύπου συμβόλαια, όπως αυτά της σχετικής απόδοσης. Στο δεύτερο κεφάλαιο, ενσωμάτωση θεμάτων που έχουν αναλυθεί διεξοδικά από την πειραματική οικονομική, όπως η «δικαιοσύνη» και η «αμοιβαιότητα», θα δώσουν μια καινούργια δυναμική στην ανάλυση της στρατηγικής διοικητικής αντιπροσώπευσης, υπό το πρίσμα της έρευνας της ανθρώπινης συμπεριφοράς στα οικονομικά.

Το τρίτο κεφάλαιο παρέχει το θεωρητικό υπόβαθρο στους ερευνητές, ώστε να εξετάσουν από εμπειρική σκοπιά, την παροχή κινήτρων σχετικά με ΕΚΕ από τους ιδιοκτήτες των επιχειρήσεων προς τους διευθυντές τους. Πιο συγκεκριμένα, ένα σημαντικό θέμα προς εμπειρική διερεύνηση, αποτελεί η συσχέτιση των διευθυντικών κινήτρων σχετικών με ΕΚΕ με τρεις συγκεκριμένους παράγοντες: την οξύτητα του ανταγωνισμού του κλάδου που λειτουργεί η επιχείρηση, την κοινωνική

ευαισθησία των εν δυνάμει καταναλωτών του τελικού προϊόντος της επιχείρησης, καθώς και την κερδοφορία της επιχείρησης. Τέλος, σχετικά με τις δυνατότητες ρύθμισης της ΕΚΕ, εναλλακτικές πολιτικές προώθησης από τον Κοινωνικό Σχεδιαστή της παροχής ΕΚΕ από τις ιδιωτικές επιχειρήσεις δεν έχουν ακόμη διερευνηθεί πλήρως. Τέτοιο μέτρο πολιτικής, είναι η παροχή πληροφόρησης από τον κοινωνικό σχεδιαστή, που μπορεί να ενισχύσει την κοινωνική ευαισθητοποίηση των καταναλωτών, άρα τα κίνητρα των ιδιωτικών επιχειρήσεων να αναλάβουν ενέργειες ΕΚΕ.



**UNIVERSITY OF CRETE  
FACULTY OF SOCIAL SCIENCES  
DEPARTMENT OF ECONOMICS  
BUSSINESS ECONOMICS AND NEW TECKNOLOGY LABORATOTY**



**Strategic Managerial Delegation and Corporate Social Responsibility in  
Oligopolistic Markets**

**by**

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# **Strategic Managerial Delegation and Corporate Social Responsibility in Oligopolistic Markets**

## **Abstract**

The aim of the current Doctoral Thesis is to shed light on the effects of firms' strategies such as strategic managerial delegation and corporate social responsibility, to their market performance and total welfare. The first chapter corresponds to the examination of the type of decisions that oligopolistic firms' owners will strategically delegate to their managers, in equilibrium. In the second chapter, the endogenous emergence of incentive contracts used by firms' owners to delegate the strategic decisions of their firm is studied. Chapter three investigates firms' owners' incentives to engage in Corporate Social Responsibility (CSR) activities in oligopoly. The last chapter examines the conditions under which the regulator can complement the provision of CSR activities by private firms in an oligopolistic market.

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## **Part I**

# **Introduction**

Orthodox economic theory considers firms as economic agents, whose main purpose is to maximize profits. In the aforementioned context, any deviation from objectives that correspond to strict profit maximization, indicates an agency problem within the firm. However, recent stylized facts reveal that contemporary firms' strategies often depart from strict profit maximization, seeking for competitive advantage in the market they operate. Such strategies may include *strategic managerial delegation* and *corporate social responsibility*. The purpose of the present Doctoral Thesis is to probe the effects of the above strategies, to firms' market performance and total welfare, in a game theoretic and industrial organization context, in order to demonstrate the strategic interactions that arise between firms in oligopolistic markets.

The first thematic area of the present thesis has to do with strategic managerial delegation from firms' owners to their managers. Two main incentives for delegation of authority from owners to managers have prevailed in the economics literature. The first refers to the need of owners to exploit specific competencies, that certain individual managers may embody, in order to improve the efficiency of their firms. More specifically, managerial theories of the firm and agency theory have emphasized on the ways an owner of the firm will provide incentives compatible to strict profit maximization to his managers. The second has to do with the acquisition of commitment ability, allowing firms' managers to render credible strategies that owners would not be willing to choose. Thus, the owner of a firm can change his rival firm's behavior in his favor, by hiring a manager whose preferences are different than his own. This sort of delegation has prevailed in the literature as strategic delegation. Empirical evidence reveal that contemporary managerial compensation practices include incentives that depart from strict profit maximization. Therefore, strategic delegation deserves high attention by economic research.

The second thematic area of the present Doctoral Thesis has been motivated by the ongoing debate among economists, about the market and welfare implications of Corporate Social Responsibility (CSR hereafter). Although there is not a unique definition of CSR, the most common one defines CSR as "*a concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with their stakeholders on voluntary basis*" (European Commission, Green Paper, 2001). This discussion was initiated by the rapid growth of firms like "The Body Shop", whose products are strongly connected to

social and ecological considerations. Other well documented examples are corporations such as “Starbucks” and “Motorola”, which not only spend large amounts of money on CSR activities, but they also promote their socially responsible actions through frequent press releases. More specifically “Starbucks” puts emphasis upon the provision of financial support for social development in the cocoa growing communities. In a similar vein, “Motorola” attempts to create an environmental concerned image, by financing recycling programs. Moreover, recent empirical research reveals that private firms make considerable efforts to become, or at least to appear as, socially responsible. More specifically, more than half of the top 100 corporations in the 16 more industrialized countries published a CSR report in the year 2005.

The present Thesis consists of four distinct chapters.

The first chapter corresponds to the examination of the type of decisions that oligopolistic firms’ owners will strategically delegate to their managers, in equilibrium. Literature so far considers that firms’ owners can strategically delegate either no decision at all, or both short-run and long-run decisions of their firm. Empirical evidence show, however, that in most cases owners tend to delegate only short-run decisions to their managers, while they prefer to preserve control on the long-run decisions. Furthermore, ex-ante commitment between the rival owners over the strategy they will follow, is always assumed.

The purpose of this chapter is two-fold: First, to examine the strategic interactions that arise between firms and the subsequent market performance, when firms owners’ alternative strategies are either Full Delegation (FD), in which they delegate both short-run and long-run decisions to their managers, or Partial Delegation (PD) in which they delegate only short-run decisions to their managers. To do so, a duopolistic industry in which firms compete in quantities (short-run decisions) and cost reducing R&D investments (long-run decisions), is assumed. Three possible configurations are considered; the first is the Universal Full Delegation (FD, FD) one, in which both the rival owners choose the Full Delegation strategy, the second refers to the Universal Partial Delegation (PD, PD) one, in which both owners select the Partial Delegation strategy, while the third is the Coexistence Delegation configuration (FD, PD) in which one owner delegates both the cost reducing R&D and the quantity decisions, while his rival delegates only quantity decisions to his manager. Focusing on symmetric scenarios, it is found that R&D investments are higher under the Universal FD, than under the Universal PD

configuration. If the initial marginal cost is relative low, then firms' profits are higher under the Universal FD comparing to the Universal PD configuration. However, this result is reversed when the initial marginal cost becomes larger. The firm that follows FD (PD) strategy in the Coexistence configuration invests more (less) in R&D, and have higher (lower) profits, than both Universal Delegation scenarios, always.

Second, to investigate which type of decisions (short-run or long-run) will prevail in equilibrium, assuming there is no credible commitment between the competing owners, regarding the strategy that they will follow. More specifically, the stability of each of the above delegation configurations is checked, through examining each firms' owners' incentives to unilaterally deviate, by employing a different delegation strategy. It is found that Universal PD is never an equilibrium delegation configuration. If the initial unit cost is relative high (low) the Universal FD (Coexistence) configuration is the only equilibrium one. However, Universal FD, is the only equilibrium regime, under the assumption of ex-ante commitment between the rival owners over the strategy they will select.

In the second chapter, the endogenous emergence of incentive contracts used by firms' owners to delegate the strategic decisions of their firm, is studied. More specifically, an oligopoly delegation model in which firms' owners choose between incentive contracts which reward managers according to combinations of profit and revenue or profit and relative performance is presented and experimentally tested. In fact, in the presence of these two alternative incentive schemes, firms' owners decide both on the objectives that should be pursued by their managers as well as on the mixture of these objectives in the manager's final reward. The need for experimental verification of the theoretical model can be justified by the argument that the theoretical literature on strategic delegation in oligopoly, may have ignored some important issues regarding behavioral aspects of the economic agents.

In the only previous experimental study on delegation of objectives in oligopoly, the choice of firm owners is limited to the terms of an exogenously imposed profit-revenue incentive scheme. Therefore, this is the first experiment allowing subjects to choose between two different incentive contract types independently and before the actual terms of the contract are chosen. Furthermore, contrary to the discrete strategy space used in the aforementioned study to implement a reduced form of the underlying game, a finer grid in both the output choice stage and



the preceding one in which the contract terms are chosen have been used.

Some of the theoretical predictions receive strong support by the results presented in this chapter, while others receive much weaker support or are even rejected. First, the prevalence of the Relative Performance contract type over the Profit Revenue alternative is strongly confirmed. However, the two motives offered by the theoretical study for such prevalence, are disentangled. The explanation based on the selection of focal, Pareto superior points receives clear support against the alternative of strategic commitment on contract types before the terms of the incentives are fixed. Second, higher aggressiveness under Relative Performance contracts is observed. Hence, the theoretic model is confirmed only for the asymmetric configuration. Third, contrary to the theoretic predictions, output is not responsive to contract type. However, unclear results regarding the predicted relation between contract terms and aggressiveness, are obtained.

Chapter three investigates firms owners' incentives to engage in Corporate Social Responsibility (CSR) activities in an oligopolistic market. The question addressed is the following: *"Why would the owner(s) of a private firm be willing to undertake costs in order to engage in activities that promote social values?"*. The present chapter addresses and formalizes this question in an oligopolistic market for a final good, where CSR effort and market decisions are delegated from owners to "socially responsible" (SR hereforth) managers, while consumers differ with respect to their valuation towards CSR activities. To my knowledge, the only previous paper, in a principal-agent context, argues that firms may include social incentives to managers besides profit maximization, only if consumers and investors reward a firm for social spending. However, the analysis in this chapter, differs from the aforementioned paper since the present work focuses on the strategic use of corporate social responsibility in imperfectly competitive markets.

The duopolistic market presented here uses a utility function that combines horizontal and vertical differentiation aspects of firms' products. The vertical differentiation represents the CSR aspects of the production process that are perceived as quality improvement of the final product by socially conscious consumers. In this context, firms' owners have two alternative strategies: either to delegate market competition decisions to a "SR" manager, or not. This reflects a common practice in the real business world, that is employing a manager with a strong

background in CSR activities to undertake not only the CSR activities, but also an active role in the overall decision making of the firm. For instance, in large corporations such as “Intel” or “Hewlett-Packard”, the announcement of hiring a socially responsible manager is accompanied with detailed report on his/hers previous SR activities and active position in the overall decision making within the firm. Delegation of authority from owners to “SR” managers is obviously a signal about the CSR activity policy that the firm is intended to follow, which is, to a large extent, credible to the consumers. Without it, it is assumed that consumers do not believe that the firm engages in CSR.

Three candidate equilibrium configurations are examined. The first is the *Universal CSR*, in which both firms’ owners employ an SR manager (thus they engage in CSR activities). The second is the *Asymmetric case*, where only one owner hires an SR manager, while his rival does not hire a manager and thus does not undertake any CSR activities. The third refers to the No CSR case, in which no owner hires an SR manager. The main finding of this chapter is that in equilibrium, each firm’s owner employs an SR manager, because by doing so he has the opportunity to increase his firm’s profits, by obtaining competitive advantage in the market. This interaction, causes owners to strategically hire managers who undertake CSR activities. Thus, Universal CSR is the only endogenously emerging equilibrium. With respect to the societal effects of CSR activities, the strategic behavior of owners hiring SR managers increases consumers’ surplus and total welfare, also.

The last chapter examines the conditions under which the regulator can complement the provision of CSR activities by private firms in an oligopolistic market. Literature on CSR so far, focuses on the difference between the provision of CSR by private firms and the regulator. The main difference between this work to the above literature is that the present chapter examines the conditions under which the regulator can complement the provision of CSR by private firms, via the provision of certification to the firms that engage in CSR activities.

Potential firms’ benefits from engaging in CSR actions may be moral obligation, sustainability, “license to operate” and reputation. For these benefits to be effective, firms have to convince potential consumers about their social orientation. However, CSR effort by firms may include cost increasing actions within their value chain, which are difficult, if not impossible to be observed by a large scope of consumers, even after consumption. Therefore, the SR attribute

of a product can be characterized as a credence good. Hence, in the absence of a credible information disclosure system, firms may fail to persuade socially conscious consumers about their true commitment to social values, hence they will have no incentives to undertake any costly CSR activity. Given this evidence, the question that arises is the following: *“Which are the policy instruments that a regulator can employ in order to promote firms’ engagement in CSR activities, and what are their effects on market outcomes and social welfare?”*.

Two alternative scenarios are investigated. The first is the "Certification by a private organization" one, assuming that a voluntary certificate provided by a private, profit maximizing organization is an appropriate system of information disclosure that permits consumers to distinguish the social characteristics of the products they purchase, without the need for a policy intervention. It is found that in this case both firms’ endogenous choice will be to engage in CSR, seeking for a competitive advantage in the market competition stage, via an increase of consumers’ willingness to pay for their final product. The above interaction among competing firms, increases consumers’ surplus and total welfare comparing to the benchmark case without CSR activities.

The second scenario refers to the case in which the regulator intervenes, in order to solve the ensuing “market of lemons” problem, by proposing a certain standard of CSR effort to the firms, and provides a certification to the firms that comply with the standard voluntary. Similar to the previous scenario, this certification endows consumers with credible information about the CSR aspects of each firm’s product, otherwise unobservable. The main finding here is that the regulator will set a standard of positive CSR effort up to a level in which both firms will have incentives to comply. This standard will be higher than the one set by the private certifier. Hence in equilibrium, consumers’ surplus and total welfare increase comparing to the benchmark case without CSR activities and the certification by a private organization configuration.

## **Part II**

# **Main Analysis**

# Chapter 1

## Do firms' owners delegate both short-run and long-run decisions to their managers in equilibrium?

### 1.1 Introduction

Orthodox economic theory treats firms as economic agents whose main objective is to maximize profits. However, modern corporations are characterized by a separation of ownership and management, in other words delegation of authority from owners to managers. According to Baik (2003) there are two main incentives for delegation. The first refers to the need of owners to exploit specific competencies that certain individual managers may embody, in order to improve the efficiency of their firms and obtain competitive advantages. The second has to do with the acquisition of commitment ability, allowing firms' managers to render credible strategies that owners would not be willing to choose. More specifically the owner of a firm can change his rival firm's behavior in his favor, by hiring a manager whose preferences are different than his own. This sort of delegation has prevailed in the literature as strategic delegation and was introduced by the seminal contribution by Schelling (1960).

More recently, Vickers (1985), Fershtman and Judd (1987) and Sklivas (1987) (hence forth VFJS), have developed the theoretical basis regarding the use of delegation to gain strategic

advantages in oligopoly. In this line of research, each owner offers an incentive contract to his manager in order to direct him to a more aggressive behavior in the market, so as to force the competing manager to reduce output. In particular, in the above series of papers, a two-stage oligopoly model is considered. In the first stage of the game profit-maximizing owners choose compensation schemes for their managers that are linear combinations of own profits and own sales. In the second stage, managers, knowing compensation terms, compete in the market over quantities. Each owner, when determining his manager's incentives, has an opportunity to obtain competitive advantage in the market, provided that the rival owner does not delegate output decisions to his manager. In equilibrium, all owners act in the same way at the game's first stage and firms end up in a prisoners' dilemma situation.<sup>1</sup>

This early work, nonetheless neglects that, despite the short-run oriented decisions such as output, there is another type of decisions that should be taken into consideration. This regards the long-run plans of the firm, such as cost reducing research and development (R&D) investments, which were first introduced to the VFJS model by Zhang & Zhang (1997). The purpose of this chapter is two-fold:

First, to examine the strategic interactions that arise between firms and the subsequent market performance, when firms owners' alternative strategies are either Full Delegation (FD), in which they delegate both short-run and long-run decisions to their managers, or Partial Delegation (PD) in which they delegate only short-run decisions to their managers. To do so, a duopolistic industry in which firms compete in quantities (short-run decisions) and cost reducing R&D investments (long-run decisions), is assumed. Three possible configurations are considered; the first is the Universal Full Delegation (FD, FD) one, in which both the rival owners choose the Full Delegation strategy, the second refers to the Universal Partial Delegation (PD, PD) one, in which both owners select the Partial Delegation strategy, while the third is the Coexistence Delegation configuration (FD, PD) in which one owner delegates both the cost reducing R&D and the quantity decisions, while his rival delegates only quantity decisions to his manager.<sup>2</sup> Focusing on symmetric scenarios, it is found that R&D investments

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<sup>1</sup>The opposite holds when VFJS assume that firms compete in prices. In this case both firms increase their profitability under strategic delegation regimes.

<sup>2</sup>It is straightforward from the VFJS model that for given technologies, delegation of decisions from owners to managers is always the dominant strategy. Thus, any subgame that includes owners' strategy to delegate no

are higher under the Universal FD than under the Universal PD configuration. If the initial marginal cost is relative low, then firms' profits are higher under the Universal FD comparing to the Universal PD configuration. However, this result is reversed when the initial marginal cost becomes larger. The firm that follows FD (PD) strategy in the Coexistence configuration invests more (less) in R&D, and have higher (lower) profits, than both Universal Delegation scenarios, always.

Second, to investigate which type of decisions (short-run or long-run) will prevail in equilibrium, assuming there is no credible commitment between the competing owners, regarding the strategy that they will follow. More specifically, the stability of each of the above delegation configuration is checked, through examining each firms' owners' incentives to unilaterally deviate, by employing a different delegation strategy. Results show that Universal PD is never an equilibrium delegation configuration. If the initial unit cost is relative high (low) the Universal FD (Coexistence) configuration is the only equilibrium one. However, Universal FD, is the only equilibrium regime, under the assumption of ex-ante commitment between the rival owners over the strategy they will select.

In this line of research, Zhang & Zhang (1997) and Z. Zhang (2002) analyze how separation of ownership and management affects firm's R&D investments and production decisions. They consider a Cournot duopoly in which either both firms choose simultaneously the Full Delegation or the No Delegation Strategy. They find that under Full Delegation and for low (high) R&D spillovers firms invest more (less) in cost-reducing R&D, produce higher (lower) output and always earn lower profits as compared to the No Delegation strategy.<sup>3</sup> In a similar context, Lambertini (2004), examines an asymmetric case in which the owner of one firm selects No Delegation, while his rival chooses Full Delegation. He finds that in equilibrium the second firm will invest more in R&D and will have higher output and profits, than the first firm, regardless from spillovers. Kopel & Riegler (2005) endogenize the selection between No Delegation and Full Delegation, by assuming credible commitment between the rival owners. Their main finding is that R&D spillovers do not effect firms' owners equilibrium strategy, hence they will always

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decisions to his manager and stick to pure profit maximization (No Delegation) is not considered here.

<sup>3</sup>In a recent paper Kopel & Riegler (2006) amend the solution concept of Zhang & Zhang (1997), showing that due to computational mistakes, some of their propositions do not hold.

choose Full Delegation.

The above research however does not consider Partial delegation as a possible owners' strategy. Empirical evidence, however, show that in most cases owners tend to delegate only short-run decisions to their managers, while they prefer to preserve control on the long-run decisions. Barcena-Ruiz and Casado-Izaga (2005) cite some interesting case-studies, which describe the type of decisions delegated, in three well known firms: B.M.W., Benetton and Microsoft. In all of the above cases, although owners delegate short-run decisions to their managers, they play a dominant role in the long-run decisions of their firm. Colombo and Delmastro (2004) use empirical results to conclude that owners will probably not delegate strategic decisions that involve considerable financial resources to their managers, such as the long-run decisions of their firms. Hence, owners will typically delegate only short-run decisions to their managers.

Barcena-Ruiz and Casado-Izaga (2005) examine whether owners of firms have incentives to follow Full or Partial Delegation under a different category of decisions. They consider location as the long-run decision and that the rival firms compete in strategic complements (prices) in the market, assuming that owners can commit themselves to a given strategy. Their main finding is that firms' owners always choose the Partial Delegation strategy. In contrast it is shown show that if firms compete in strategic substitutes (quantities) and there is no credible commitment for the chosen owners' strategy, then Partial Delegation is never equilibrium.

The rest of this chapter is organized as follows: Section 1.2 presents the model. In Section 1.3, the different subgames are solved and a detailed comparative analysis is presented. In Section 1.4, the conditions under which delegation emerges endogenously, are investigated, assuming no ex-ante commitment between the competing owners. In Section 1.5, the case where there is credible commitment over the type of the decisions owners delegate to managers, is examined. Section 1.6 offers some concluding remarks.

## **1.2 The Model**

In this section a model embodying managerial incentives, R&D investments and output market competition is developed. Consider a homogeneous duopolistic industry in which, firms are



denoted by  $i, j = 1, 2, i \neq j$ . The inverse demand function of the final good is linear, and is given by:

$$P = A - Q \quad (1.1)$$

where,  $A > 0$  and  $Q = q_1 + q_2$  is the aggregate output.

Each firm is endowed initially with constant returns to scale technology in which marginal cost equals  $C$ . Following D'Aspremont & Jacquemin (1988), and Zhang & Zhang (1997) firm  $i$  can invest in R&D for cost-reducing process innovation, which decreases its marginal cost to  $C - x_i$ , where  $x_i$  is the cost reduction due to R&D investments. There are diminishing returns to R&D, i.e. the cost of R&D is given by  $rx_i^2$ , where  $r$  is a measure of effectiveness of R&D. As  $r$  increases, the expenditure required for a firm to obtain a given cost reduction also increases. Thus, the parameter  $r$  is negatively related to the efficiency of the R&D technology. To guarantee interior solutions it is assumed that  $\frac{1}{4} \leq c = \frac{C}{A} \leq 1$  and  $r \geq \underline{r} = 2.25$ , where  $c = \frac{C}{A}$  represents the efficiency of the initial technology relative to the market size. Hence, the initial marginal cost should be relative high, so as firms have incentives to reduce it by spending in cost reducing R&D, and the effectiveness of an R&D investment is not too high.<sup>4</sup> Thus, firm  $i$ 's total cost function is given by:

$$TC_i = (C - x_i)q_i + rx_i^2, \quad i = 1, 2 \quad (1.2)$$

Therefore firm  $i$ 's profit function is:

$$\Pi_i = (A - q_1 - q_2)q_i - (C - x_i)q_i - rx_i^2, \quad i, j = 1, 2; i \neq j \quad (1.3)$$

In this market, each firm has an owner and a manager. Following Fershtman and Judd (1987), the term ‘‘owner’’, refers to a decision maker whose objective is to maximize the profits of the firm. This could be the actual owner, a board of directors, or a chief executive officer. ‘‘Manager’’ refers to an agent that the owner hires to make real time operating decisions, and could maximize profits or act according to a personal objective function.

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<sup>4</sup>It is also assumed that there are no R&D spillovers.

Following VFJS, each owner offers to his manager a “take it or leave it” incentive contract.<sup>5</sup> Under this contract, the incentive structure takes a particular form: the risk-neutral manager  $i$  is paid at the margin, in proportion to a linear combination of own profits and own sales. More formally, firm  $i$ ’s manager will be given incentive to maximize:

$$M_i = a_i \Pi_i + (1 - a_i) R_i \quad (1.4)$$

Where  $a_i$  is the managerial incentive parameter and  $\Pi_i$  and  $R_i$  denote firm  $i$ ’s profits and revenues respectively. Note that owner  $i$ , by setting different levels of  $a_i$  can manipulate the aggressiveness of his manager, because the manager acts as if his firm’s marginal cost were  $a_i(C - x_i)$ .<sup>6</sup> Thus if owner  $i$  chooses  $a_i < 1$ , he provokes his manager to put higher weight on revenues, therefore he becomes more aggressive. If  $a_i = 1$ , then manager  $i$  is profit maximizer and subsequently, owner  $i$  and manager  $i$  coincide since  $M_i = \Pi_i$ .<sup>7</sup> It is assumed that firms’ owners cannot commit themselves to a given strategy.<sup>8</sup>

In order to examine which type of decisions will firms’ owners delegate to their managers in equilibrium, a four stage game is considered, with the following timing: in the first stage both firms’ owners, simultaneously and independently, decide if they will delegate both the R&D investments and quantity decisions to their managers (thus they choose whether to follow the Full or the Partial Delegation strategy). Hence, in the case of FD, the owner of firm  $i$  sets  $a_i$  optimally in the first stage, before manager  $i$  decides over R&D investments.<sup>9</sup> If owner  $i$  chooses to follow the PD strategy, then  $a_i$  is selected after the R&D investments stage. In the

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<sup>5</sup>Although in real life the terms of managerial contracts can be determined via owners-managers negotiations, it is a regular assumption in the strategic delegation literature that the market for managers is perfectly competitive and the owners have all the power during negotiations, i.e., they offer to their managers “take it or leave it” incentive contracts (see Vickers, 1985; Fershtman and Judd, 1987; and Sklivas, 1987).

<sup>6</sup>This can be seen if one rewrites 1.4 as  $M_i = R_i - a_i TC_i$  (Zhang & Zhang, 1997).

<sup>7</sup>A standard assumption in strategic delegation literature is that manager  $i$  will finally receive only his reservation wage. Since his reward is linear in profits and revenues, he is compensated with  $A_i + B_i M_i$  for some constants  $A_i, B_i$  with  $B_i > 0$ . Since he is risk neutral, he acts so as to maximize  $M_i$  and the values of  $A_i$  and  $B_i$  are irrelevant.

<sup>8</sup>In Section 1.5 the case in which owners can commit to a certain strategy during a stage zero of the game, is discussed.

<sup>9</sup>This assumption is essential in order for delegation to have strategic value. Katz (1991) argues that unobservable contracts have no commitment value at all. Fershtman and Judd (1987) support that even if contracts are not observable, they will become common knowledge when the game is being repeated for several periods. More recently, Kockesen & Ok (2004) argue that to the extent that renegotiation is costly and/or limited, in a general class of economic settings, strategic aspects of delegation may play an important role in contract design, even if the contracts are completely unobservable.

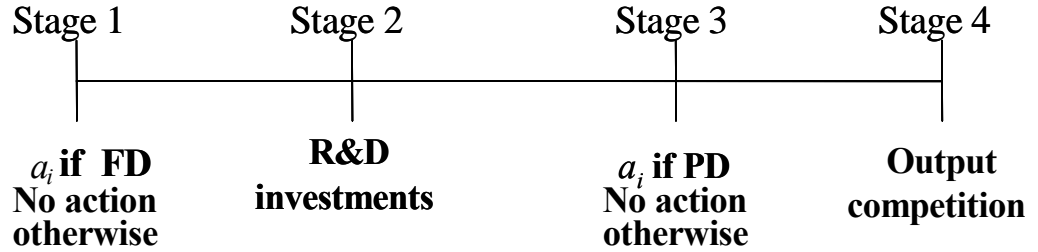


Figure 1-1: The timing of the game.

next stage R&D investments are decided simultaneously, either by owners or by managers. In stage three, only the owner(s) who chooses to follow the PD sets  $a_i$ . In the last stage, both managers compete in quantities.<sup>10</sup> The above game will be solved backwards, by employing the Subgame Perfect Nash Equilibrium (SPNE) solution concept. Figure 1-1 visualizes the timing of the game.

### 1.3 Equilibrium Analysis

The game has three different subgames which provide us with the candidate equilibrium configurations: the first is the Universal Full Delegation (FD, FD) one, in which the rival owners delegate both the R&D investments and the quantity decisions to their managers. The second refers to the Universal Partial Delegation (PD, PD) one, in which only quantity decisions are delegated to managers. The third is the Coexistence Delegation configuration (FD, PD) in which one owner delegates both the R&D investments and the quantity decisions to his manager, whereas his rival delegates only quantity decisions to his manager.

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<sup>10</sup>It is important to be noticed that the timing of the game is shaped as above because, in the real business world it is common practice to decide about the long-run plans of the firm first, and according to them, decide about the short-run issues. See for instance Zhang & Zhang (1997).

In the last stage of the game, given R&D investments and the optimal incentives to managers, each manager sets output to maximize his objective function given by eq.(1.4). From the First Order Conditions (foc) the reaction function of each manager is given by:

$$q_i = \frac{A - q_j - a_i(C - x_i)}{2} \quad (1.5)$$

By solving and rearranging one obtains the equilibrium output of the fourth stage:

$$q_i(x_i, x_j, a_i, a_j) = \frac{A + a_j(C - x_j) - 2a_i(C - x_i)}{3} \quad (1.6)$$

As usual, given that firms compete in quantities, quantity set by manager  $i$  increases with  $a_j$  and decreases with  $a_i$ .<sup>11</sup>

### 1.3.1 Universal Full Delegation: (FD,FD).

Considering the FD configuration, in the first stage owners set the managerial incentives for their managers. In the second stage managers compete in R&D investments, while in the third stage there is no action.

Hence, in the second stage, given the optimal incentives set by owners, managers maximize their compensation (eq.1.4) with respect to R&D investments. The solution of the system of foc yields firm  $i$ 's optimal R&D investments:

$$x_i(a_i, a_j) = \frac{6r(A - 2a_iC + a_jc) - 4a_j(A - a_iC)}{27r^2 - 12r(a_i + a_j) + 4a_ia_j} \quad (1.7)$$

In the first stage of the subgame, owners set simultaneously the incentive parameters  $a_i$ ,  $a_j$  so as to maximize their profits. With respect to  $c = \frac{C}{A}$ , imposing symmetry, solving the system of foc and rearranging, the equilibrium values for the managerial incentive parameters are given by:

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<sup>11</sup>It is already known from the strategic delegation literature (see VFJS), that since quantities are strategic substitutes, then incentives are also strategic substitutes. The intuition behind this is that each owner encourages his manager to behave more aggressively (by setting the lowest possible  $a_i$ ), because this way he can obtain a decrease in his rivals output and an increase in their own output, thus they can obtain competitive advantage in the market. This is easy to be shown in the present model from eq.(1.5) and (1.6).

$$a_i = a_j = a^{FF}(c, r) = \frac{8 - 3r[c(22 + 45r) - 12] + \Psi}{24 - 4c(27r + 2)} \quad (1.8)$$

Where,

$$\Psi = \sqrt{64 - 576r - 672rc + 9r^2c\{720 - 432r + c[196 + 9r(225r - 212)]\}}$$

By substituting eq.(1.8) in (1.7), (1.6) and (1.3) the equilibrium values of R&D investments, output and profits:  $x^{FF}$ ,  $q^{FF}$  and  $\Pi^{FF}$  respectively, are obtained.<sup>12</sup>

### 1.3.2 Universal Partial Delegation: (PD,PD).

In the first stage of this subgame there is no action. In the second stage, owners decide about R&D investments, while in the third stage, owners set the incentive schemes for their managers.

Therefore, in the third stage of the game, each owner chooses optimally his manager's incentives, by maximizing his profits with respect to  $a_i$ . The solution of the system of foc yields the following  $a_i$ :

$$a_i(x_i, x_j) = \frac{2(3C - 4x_i) + 2x_j - A}{5(C - x_i)} \quad (1.9)$$

In the second stage, owners simultaneously set R&D investments so as to maximize their profits. By substituting  $c = \frac{C}{A}$ , imposing symmetry, solving the system of foc and rearranging, the SPE values of the R&D investments are obtained:

$$x_i = x_j = x^{PP}(c, r) = \frac{6(1 - c)}{25r - 6} \quad (1.10)$$

By substituting eq.(1.10) in (1.9), (1.6) and (1.3) the SPE values of the managerial incentive parameter, quantity and profits respectively are given by:

$$a^{PP}(c, r) = \frac{6 + 5r(1 - 6c)}{6 - 25cr} \quad (1.11)$$

$$q^{PP}(c, r) = \frac{10r(1 - c)}{25r - 6} \quad (1.12)$$

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<sup>12</sup>Due to space limits, some algebraic formulas are not presented. These are available from the authors, upon request.

$$\Pi^{PP}(c, r) = \frac{2r(25r - 18)(1 - c)^2}{(25r - 6)^2} \quad (1.13)$$

At this point it is interesting to investigate the way that the different delegation strategies affect R&D investments, the managerial incentive parameters, output and profits, in the two symmetric delegation configurations.

Comparing the R&D investments given by  $x^{FF}$  and  $x^{PP}$  respectively, the following proposition holds.

**Proposition 1** *In a symmetric delegation game, firms always invest more in R&D in the Universal Full Delegation configuration, comparing to the Universal Partial Delegation one.*

The intuition behind proposition 1 is that, in Universal FD non profit maximizing (hence, more aggressive) managers decide about R&D investments, which increases competition in the R&D investments stage of the game, comparing to Universal PD, in which case, less aggressive profit maximizing owners invest in R&D.

Proposition 2 compares the managerial incentive parameters given by  $a^{FF}$  and  $a^{PP}$  respectively:

**Proposition 2** *In the Universal Partial Delegation configuration, managers are manipulated by owners to be more aggressive, than in the Universal Full Delegation one.*

This proposition implies that the managerial incentive parameter is always higher in Universal FD than in Universal PD. The insight behind this result is that increased R&D investments lead to better technology and to less aggressiveness during the quantity competition case in FD, than in PD. Hence, in Universal FD owners will set a higher managerial incentive parameter in order to stimulate their managers to become less aggressive, comparing to the Universal PD configuration.

Proposition 3 stands for the comparison of the firms' output given by  $q^{FF}$  and  $q^{PP}$  respectively.

**Proposition 3** *In a symmetric delegation game, if firms' initial marginal cost is relatively low (high), firms produce lower (higher) output in Universal Full Delegation, than in the Universal Partial Delegation configuration.*

For proof see Appendix.

The intuition behind this result, is the output effect in R&D investments.<sup>13</sup> By propositions 1 and 2 it is obvious that there are two opposite effects on output. First, in Universal FD firms will invest more in R&D, thus better technology leads to higher output, than in Universal PD. Second in Universal FD owners will typically choose softer incentive schemes for their managers, causing lower output comparing to the Universal PD configuration. For relatively low initial unit cost the dominant effect is the second. However if the initial marginal cost is high, given R&D investments, the dominant effect is the first, because the gain from the reduction of the marginal cost increases, if production is amplified. Therefore, under relatively high  $c$ , firms that have invested more in R&D in the early stages of the game (this is, in Universal FD), tend to produce more, in order to increase the benefit from the technology improvement.

Proposition 4 compares firms' profits given by  $\Pi^{FF}$  and  $\Pi^{PP}$  respectively.

**Proposition 4** *In a symmetric delegation game, if firms initial marginal cost is relatively low (high), then for  $r > r$  firms make higher (lower) profits in Universal Full Delegation than in the Universal Partial Delegation configuration.*

For proof see Appendix.

The rational here is that, by propositions 1, 2 and 3, there are three effects on firms' profits. First, in FD firms will have higher expenses in R&D, which increases cost and reduces their profitability comparing to PD. Second, in FD owners will typically choose softer incentive schemes for their managers, which increase firms' profits, since it weakens the prisoners' dilemma effect comparing to PD. Third, overproduction by both firms under strategic delegation regimes is negatively connected their profitability. For low  $c$ , higher output and fiercer market competition in the Universal PD configuration leads to lower profits, than in Universal FD. For high  $c$ , higher output and R&D expenses under Universal FD leads to the opposite result. Figure 1-2 visualizes the results in propositions 3 and 4 respectively.

### 1.3.3 Coexistence of Delegation Schemes: (FD,PD).

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<sup>13</sup>See Bester & Petrakis (1993).

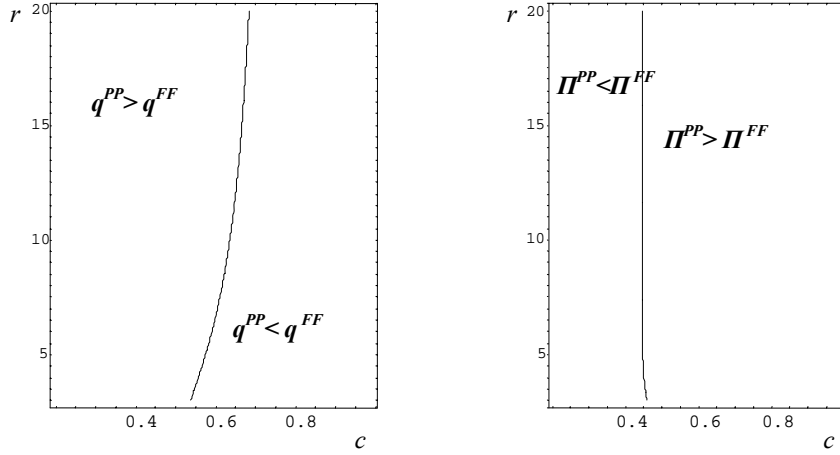


Figure 1-2: Firms' output and profits in Univ.FD and Univ.PD configurations.

In the Coexistence configuration, without loss of generality, it is assumed that owner  $i$  follows the FD strategy, while his rival chooses the PD one. Hence, in the first stage of this subgame owner  $i$  selects the managerial incentives for his manager, while his rival takes no action. In the next stage manager  $i$  and owner  $j$  decide about the R&D investments, following which owner  $j$  set the incentives for his manager.<sup>14</sup>

In the third stage of the game, owner  $j$  chooses  $a_j$  that maximizes his profits. By taking the foc and solving one obtains:

$$a_j(x_i, x_j, a_i) = \frac{6}{4} - \frac{A + a_i(C - x_i)}{4(C - x_j)} \quad (1.14)$$

In the second stage of the game, manager  $i$  and owner  $j$  choose R&D investment levels to maximize their compensation and profits respectively. The solution of the system of the foc yields to the following expressions:

$$x_i(a_i) = \frac{3[A(r - 1) + C(a_i + 2r - 3a_i)]}{8r(2r - 1) - 3a_i(3r - 1)} \quad (1.15)$$

<sup>14</sup>Here the sequence of decisions is set this way, so as the R&D investments and output decisions are taken simultaneously. Also see Barcena-Ruiz and Casado-Izaga (2005) for a similar timing.



$$x_j(a_i) = \frac{3a_i(A - C) - 4r[A - C(2 - a_i)]}{3a_i(3r - 1) - 8r(2r - 1)} \quad (1.16)$$

In the first stage of the game, owner  $i$  maximizes his profits with respect to  $a_i$ . By solving the foc one obtains the SPE value of the managerial incentive parameter for manager  $i$ :

$$a_i^{FP}(c, r) = \frac{r[c(64r^2 - 98r + 22) - r(16r - 7) + 12] - 3}{(3r - 1)\{6 - 6r + c[r(16r - 19) - 3]\}} \quad (1.17)$$

By substituting eq.(1.17) in (1.16), (1.15), (1.6) and (1.3) each firm's equilibrium values of R&D investments, managerial incentive parameter, output and profits of each firm respectively are given by:

$$a_j^{FP}(c, r) = \frac{r\{14 + 9r - 8r^2 + 4c[r(14r - 25) + 5]\} - 3}{r\{17 - 8r + c[r(48r - 83) + 17]\} - 3} \quad (1.18)$$

$$x_i^{FP}(c, r) = \frac{6(r - 1)(1 - c)}{r(16r - 25) + 3} \quad (1.19)$$

$$x_j^{FP}(c, r) = \frac{(1 - c)[r(8r - 17) + 3]}{(3r - 1)[r(16r - 25) + 3]} \quad (1.20)$$

$$q_i^{FP}(c, r) = \frac{8r(r - 1)(1 - c)}{r(16r - 25) + 3} \quad (1.21)$$

$$q_j^{FP}(c, r) = \frac{2r(1 - c)[r(8r - 17) + 3]}{(3r - 1)[r(16r - 25) + 3]} \quad (1.22)$$

$$\Pi_i^{FP}(c, r) = \frac{4r(r - 1)^2(1 - c)^2}{r(48r^2 - 91r + 34) - 3} \quad (1.23)$$

$$\Pi_j^{FP}(c, r) = \frac{r(2r - 1)(1 - c)^2[r(8r - 17) + 3]^2}{[r(48r^2 - 91r + 34) - 3]^2} \quad (1.24)$$

By comparing equilibrium values of R&D investments, managerial incentive parameter, output and profits in the Coexistence configuration, to the ones obtained in both the symmetric delegation configurations (Universal FD and Universal PD) the following proposition holds:

**Proposition 5** *In the Coexistence configuration, the owner of firm  $i(j)$  increases (decreases) the aggressiveness of his manager, comparing to both symmetric delegation configurations. Thus firm  $i(j)$  invests more (less) in R&D, produces higher (lower) output and has higher (lower) profits, comparing to its competitor and both symmetric delegation configurations, always.*

The intuition behind this result is that since owner  $i$  sets the managerial incentives for his manager first, he becomes leader in incentives, thus he increases the aggressiveness of his manager in order to obtain competitive advantage over his competitor in the subsequent stages of the game. Moreover from (1.17) one obtains that if  $c \in [0.25, 0.44)$ ,  $r \geq \underline{r}$  then  $a_i^{FP} \leq 0$ . This means that owner  $i$  may give a negative weight on profits (hence even higher weight on sales) in his manager's utility, in order to induce a more aggressive behavior by his manager and hence strengthen his leadership in incentives. As a result his manager invests more in R&D produces higher output and firm has higher profits comparing to both symmetric delegation configurations and his rival.

## 1.4 Equilibrium Delegation Schemes

In this section the determination of the equilibrium delegation configuration is examined, under the assumption that there is no ex-ante commitment between the rival owners. As is standard in the game theoretic literature, first a candidate equilibrium configuration is proposed, and then one has to check whether or not it survives all possible deviations. Thus, owners' incentives to unilaterally deviate from each of the above candidate equilibrium configurations have to be checked. The procedure has as follows: given that the owner of firm 1 has chosen one of the above strategies (PD or FD), the owner of firm 2 examines his profitability, if he switches to a strategy different than the one specified in each candidate equilibrium configuration.

All possible scenarios are checked and the main findings are that firms' owners always have incentives to deviate from the Universal PD configuration. Regarding the Coexistence configuration, if the initial unit cost is relative high (low), the owner that had initially chosen the PD strategy will always (never) have incentives to deviate towards FD. If the initial unit cost is relative high (low) owners never (always) have incentives to deviate from the Universal FD configuration. The following proposition summarizes:

**Proposition 6** *For given  $r \geq \underline{r}$ , if  $c$  is relatively low then the Coexistence configuration is an equilibrium one. For given  $r \geq \underline{r}$ , if  $c$  is sufficiently large then Universal Full Delegation is an equilibrium configuration.*

In what follows, the main arguments that drive the results, are discussed.

#### 1.4.1 Universal Full Delegation as a candidate equilibrium.

Universal Full Delegation is an equilibrium configuration if no owner has incentives to unilaterally deviate towards the PD strategy. The deviation game unravels as follows: given the fact that firm 1's owner delegates both short-run and long-run decisions to his manager, believing that firm 2's owner will do the same, firm 2's owner deviates by delegating only short-run decisions to his manager. In the first stage of the deviation game firm 1's owner chooses the managerial incentive parameter  $a_1 = a^{FF}$ , while firm 2's owner postpones his decision. At the next stage R&D decisions are taken by manager 1 and owner 2, following which, owner 2 sets the incentive parameter of his manager optimally. Finally at the last stage both firms' managers compete in quantities.<sup>15</sup>

By comparing the deviant owner's profits,  $\Pi_2^d$ , to the profits that result in Universal FD,  $\Pi^{FF}$ , one obtains that  $\Pi_2^d > \Pi^{FF}$  ( $\Pi_2^d < \Pi^{FF}$ ) for relatively low (high)  $c$ . Thus if the initial unit cost is relatively high, no firm's owner has incentives to deviate from Universal FD.

It is important to note that there are two main levels of competition that both influence negatively the profitability of each strategy: market and R&D competition. While in general in the FD strategy quantity competition is softer, R&D competition is more intense, comparing to the PD one.

In case of Universal FD, it is obvious that if  $c$  is relatively high, then each firm's owner has incentives to remain more aggressive during the R&D competition stage (by delegating long-run decisions to his manager) in order to be benefited from the reduction of the unit cost, during the market competition stage. Hence there are no incentives for deviation towards PD. But if  $c$  is relatively low, then both firm's owners have incentives to increase their profitability comparing to their previous status, by switching from Full to Partial Delegation, so as to reduce their

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<sup>15</sup>See appendix for the solution concept.

R&D expenditures, since the gain from the reduction of the marginal cost is also low. Thus, Universal FD is an equilibrium configuration, only if the initial marginal cost is relatively high.

### 1.4.2 Universal Partial Delegation as a candidate equilibrium.

The next proposed candidate equilibrium configuration is the Partial Delegation one. To check the stability of this configuration the following deviation game is considered: given owner 2's choice to delegate only short-run decisions to his manager, firm 1's owner examines his firms' profitability, if he deviates and delegates both short-run and long-run decisions to his manager. Hence, in the first stage owner 1 deviates and selects the managerial incentives for his manager  $a_1 = a_i^{FP}$ , while his rival takes no action. In the next stage manager 1 and owner 2 set the R&D investments, following which owner 2 sets the incentives for his manager. In the final stage both managers compete in quantities. Note that, the solution concept of this deviation game coincides with the Coexistence Delegation configuration. Hence the deviant owner's profits are given by:  $\Pi_1^d = \Pi_i^{FP}$ .

Since from proposition 5  $\Pi_1^d = \Pi_i^{FP} > \Pi^{PP}$ , thus, the deviant owner's profits are higher comparing to the profits that result in the Universal PD configuration, always. Therefore, both firms' owners always have incentives to deviate from the Universal PD scenario towards the FD strategy, because this way they will become leaders in incentives, and obtain competitive advantage in the market. Hence, Universal PD is never an equilibrium configuration.

### 1.4.3 Coexistence scenario as a candidate equilibrium.

In order to examine if the Coexistence configuration is an equilibrium one, one has to check for two possible deviations. Firstly, owner 1 may deviate from FD to the PD strategy. Secondly owner 2 may deviate from PD to the FD strategy.

Thus, in the first deviation game, under the assumption that owner 2 delegates only short-run decisions to his manager, firm 1's owner deviates by also delegating only short-run decisions to his manager. In the first stage of the game owner 1 decides to deviate to PD thus he takes no action, following which, both owners invest in R&D optimally. Here, the deviation game is identical to the Universal PD scenario. The rational behind this is that since owner 1 takes no action during the first stage of the game, his intention to deviate becomes common knowledge

in the second stage.

By considering proposition 5 and comparing the deviation profits of owner 1 ( $\Pi_1^d = \Pi^{PP}$ ) to the profits that the same owner obtains in the Coexistence Delegation scenario ( $\Pi_i^{FP}$ ) it is obtained that  $\Pi_1^d < \Pi_i^{FP}$ , always. Thus owner 1 has no incentives to deviate towards PD strategy.

In the second deviation game, given the fact that firm 1's owner delegates both short-run and long-run decisions to his manager, firm 2's owner deviates by also delegating both short-run and long-run decisions to his manager. In the first stage of the deviation game firm 1's owner chooses the managerial incentive parameter  $a_1$  believing that firm 2's owner will follow the PD strategy thus he sets  $a_1 = a_i^{FP}$ . On the other hand, firm 2's owner sets the managerial incentive parameter that is the best response to his rivals choice:  $a_2(a_1)$ . In stage two, both managers invest in R&D, following which both managers compete in quantities.<sup>16</sup>

By comparing the deviation profits,  $\Pi_2^d$ , to the profits that result in the Coexistence Delegation scenario one obtains that  $\Pi_2^d > \Pi_j^{FP}$  ( $\Pi_2^d < \Pi_j^{FP}$ ) for relatively high (low)  $c$ . Thus, if the initial unit cost is relatively low (high), owner 2 has no(always) incentives to deviate towards FD.

The intuition behind this result is that for relatively high initial marginal cost, owner 2 has incentives to deviate towards FD, because he seeks to be benefited from the reduction of the initial marginal cost that is created from the increased R&D investments in FD. But if the initial marginal cost is low, this benefit is also low, thus there are no incentives for deviation towards FD. On the other hand owner 1, given the fact that his rival follows PD strategy, he is leader in incentives and therefore dominates the market, thus he will never deviate towards PD because such an act would decrease his profitability comparing to his previous status. Therefore, if the initial unit cost is relatively low, the Coexistence configuration is an equilibrium one.

## 1.5 Extensions

Existing literature, attempts to endogenize the selection of the equilibrium delegation strategy, by assuming that there is credible commitment between the rival owners, when they select their

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<sup>16</sup>See appendix for the solution concept.

	Owner $j$		
		FD	PD
Owner $i$	FD	$\Pi_i^{FF}$	$\Pi_i^{FR}$
		$\Pi_j^{FF}$	$\Pi_j^{FP}$
	PD	$\Pi_i^{PF}$	$\Pi^{PP}$
		$\Pi_j^{PF}$	$\Pi^{PP}$

Figure 1-3: Matrix of profits at stage zero.

delegation strategy. Therefore an examination of how the results may change under the same assumption is necessary.

The timing of the game remains the same, except now a stage zero is added, in which owners commit over the strategy that they will choose. As argued above, there are three different subgames: the first is the Universal FD configuration, the second refers to the Universal PD one, while the third is the Coexistence configuration. All the above scenarios have already been examined and the corresponding profits are shown in figure 1-3. The following proposition summarizes:

**Proposition 7** *Assuming the existence of ex-ante commitment ability between the rival owners over the type of decisions that they will delegate, Universal Full Delegation is the unique Subgame perfect Nash equilibrium.*

The rationale behind this result is that from figure 3 and proposition 5, the FD dominates the PD strategy. If owner  $i$  selects PD then owner  $j$ 's best response is FD, since  $\Pi_j^{PF} > \Pi^{PP}$ . Moreover if owner  $i$  selects FD then owner  $j$ 's best response again is PD, since  $\Pi^{FF} > \Pi_j^{FP}$ . Hence, under the assumption of credible commitment between the competing owners, Universal FD is the unique equilibrium configuration. Hence altering the ex-ante commitment assumption, leads to different equilibrium strategy for low initial marginal cost.

## 1.6 Conclusions

The literature regarding strategic delegation in oligopoly with R&D investments, considers that firms' owners' alternative strategies are either Full Delegation or No Delegation.

A more realistic model is assumed, where firms' owners alternative strategies are either Full Delegation, in which owners delegate both the cost reducing R&D and the quantity decisions to their managers, or Partial Delegation, in which quantity decisions are delegated to managers, while owners decide themselves the cost reducing R&D investments. In order to examine the implications from each delegation strategy to firms' R&D investments and market performance, three possible configurations are compared; the first is the Universal Full Delegation (FD, FD) one, the second refers to the Universal Partial Delegation (PD, PD) one, while the third is the Coexistence configuration (FD, PD). It is found that R&D investments are higher in Universal FD than in the Universal PD configuration. If the initial marginal cost is relative low, then firms' profits are higher in Universal FD comparing to the Universal PD configuration. However, this result is reversed when the initial marginal cost grows larger. In the Coexistence configuration, the firm that follows FD (PD) strategy always invests more (less) in R&D, and have higher (lower) profits, than both symmetric delegation configurations.

After having compared the three alternative delegation configurations, which one will prevail in equilibrium is examined, assuming that there is no credible commitment between competing owners regarding the type of decisions delegated to managers. To do so, firms' owners incentives to deviate from each of the above candidate equilibrium configurations are investigated. It is found that owners always have incentives to deviate from Universal Partial Delegation. If the initial unit cost is relative high (low) owners have always (never) incentives to deviate from the Coexistence configuration. If the initial unit cost is relative high (low) owners will never (always) deviate from Universal Full Delegation. Conversely, under the assumption of credible commitment, the Universal Full Delegation is the unique equilibrium configuration.

The analysis was carried out for a duopolistic market structure. I am of the opinion that the duopolistic market reveals all essential implications considering the firms' owners' incentives to strategically delegate their firm's decisions to managers. I also am aware of the limitations of the present analysis in assuming specific functional forms. However, it is the nature of the equilibrium conditions that drive the present results that allows us to argue that these

results will also hold under general demand and cost functions. The use of more general forms would jeopardize the clarity of the aforementioned findings, without significantly changing their qualitative character. Given the current debate about the market implications of Strategic Managerial Delegation the present chapter sheds light on the type of decisions firms' owners will delegate to managers in oligopolistic markets.

## 1.7 Appendix

### Appendix A1: Proof of proposition 3

By comparing the SPE values of firms' output in Universal FD and Universal PD,  $q^{FF}$  and  $q^{PP}$ , respectively, it can be shown that if  $c \in [0.25, 0.54), r \geq \underline{r}$ , then  $q^{FF} - q^{PP} < 0$ . If  $c \in [0.54, 1), r \geq \underline{r}$ , then  $q^{FF} - q^{PP} > 0$ .

### Appendix A2: Proof of proposition 4

By comparing the SPE values of firms' profits in Universal FD and Universal PD,  $\Pi^{FF}$  and  $\Pi^{PP}$ , respectively, it can be shown that that if  $c \in [0.25, 0.46), r \geq \underline{r}$ , then  $\Pi^{FF} - \Pi^{PP} > 0$ . If  $c \in [0.46, 1), r \geq \underline{r}$ , then  $\Pi^{FF} - \Pi^{PP} < 0$ .

### Appendix B1: Universal FD configuration's deviation game.

Here, the solution concept of the deviation game coincides to the one in the Coexistence configuration, except in the first stage owner 1 will set  $a_1 = a^{FF}$  believing that firm 2's owner will do the same. By substituting  $a_1 = a^{FF}$  in eq.(1.16), (1.15), (1.6) and (1.3) the deviant firm's profits are given by  $\Pi_2^d$ .

### Appendix B2: The Coexistence configuration's deviation game.

Here, the second deviation game coincide to the solution concept in the Universal FD, except in the first stage of the deviation game firm 1's owner chooses the managerial incentive parameter  $a_1$  believing that firm 2's owner will follow the PD strategy thus he sets  $a_1 = a_i^{FP}$ . On the other hand, firm 2's owner sets the managerial incentive parameter that is the best response to his rivals choice:  $a_2(a_1)$ . Hence, he maximizes:



$$\Pi_2^d[a_1 = a_i^{FP}, a_2(a_1)] \quad (1.25)$$

with respect to  $a_2$  in order to obtain  $a_2^d$ . Plugging  $a_2^d$  in eq.(1.25) the deviant profits  $\Pi_2^d$ , result.

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## Chapter 2

# Strategic delegation in experimental duopolyes with endogenous incentive contracts.

### 2.1 Introduction

Neoclassical economics consider firms as economic agents whose main objective is to maximize profits. However seminal papers such as Baumol (1958) suggested a sales-maximization model of firms' objective function as a realistic alternative to the profit-maximization one. More recently, Fershtman and Judd (1987) argue that a proper analysis of the firm's objective function should be undertaken under the prism of the separation of ownership and management.<sup>1</sup> They further argue that such an analysis should incorporate the structure of the incentives that owners offer to managers in order to motivate them.

The strategic use of managerial incentive contracts has been introduced in the literature by Vickers (1985), Fershtman (1985), Fershtman and Judd (1987) and Sklivas (1987). In this line of research, each owner has the opportunity to delegate market competition decision and offer an incentive contract to his manager in order to direct him to a more aggressive behavior

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<sup>1</sup>Managerial theories of the firm and agency theory have emphasized that the aforementioned separation leads to inefficiencies due to asymmetric information and differing objectives of managers and owners (e.g., Williamson, 1964; Jensen and Meckling, 1976; Fama and Jensen, 1983).

in the market, so as to force the competing manager to reduce output. When determining his manager's incentives each owner has an opportunity to obtain competitive advantage via delegation, provided that rival owners do not delegate any decisions to managers. In equilibrium, all owners act in the same way, engaging in a prisoners' dilemma.

In this context, the choice of contract terms determines whether the manager's reward will depend more on the firm's profits or some other alternative objective like for example the firm's sales. Incentive schemes which are combinations of profit and revenue have been extensively studied. On the contrary, other types of incentive contracts which reward the manager according to different objectives like relative performance in the market have received much less attention. Miller and Pazgal (2001, 2002, 2005) formalize the idea that each manager may be concerned with the competing firms' performance when making his decision, under the 'Relative Performance' type of delegation schemes. The equilibrium outcome of the aforementioned model is similar to the one obtained under the one that includes linear combination of profits and sales delegation schemes.

In this chapter, an oligopoly delegation model in which firms' owners choose between incentive contracts which reward managers according to combinations of profit and revenue or profit and relative performance, is presented and experimentally tested. In fact, in the presence of these two alternative incentive schemes, firms' owners decide both on the objectives that should be pursued by their managers as well as on the mixture of these objectives in the manager's final reward. Theoretical results show that owners will induce their managers the objective of maximizing their firm's performance relative to other firms.

To my knowledge, Huck et al. (2004) is the only previous experimental study on delegation of objectives in oligopoly. However, in their framework, the choice of firm owners is limited to the terms of an exogenously imposed profit-revenue incentive scheme. Therefore, the present work is the first experiment allowing subjects to choose between two different incentive contract types independently and before the actual terms of the contract are chosen. Furthermore, contrary to the discrete strategy space used by these authors to implement a reduced form of the underlying game, a finer grid have been used, in both the output choice stage and the preceding one in which the contract terms are chosen.

Some of the theoretical predictions receive strong support by the experimental results, while

others receive much weaker support or are even rejected. First, the prevalence of the Relative Performance contract type over the Profit Revenue alternative is strongly confirmed. However, the two motives offered by the theoretical study for such prevalence, are disentangled. The explanation based on the selection of focal, Pareto superior points receives clear support against the alternative of strategic commitment on contract types before the terms of the incentives are fixed. Second, higher aggressiveness under Relative Performance contracts is observed. Hence, the theoretic model is confirmed only for the asymmetric configuration. Third, contrary to the theoretic predictions, output is not responsive to contract type, however results are not clear regarding the relationship between output and contract terms.

The above experimental results indicate that the theoretical literature on strategic delegation in oligopoly may have ignored some important issues that matter in this context. The most prominent among the issues ignored in the aforementioned theoretical models seems to be fairness. Given that owners and managers are assumed to be absolute own utility maximizers, the latter are expected to accept any reward above their reservation salary no matter how unfair the split of the firm's profits may be. However, since the seminal ultimatum experiment by Güth et al. (1982), it is known that an agent receiving an unequal proposal of sharing a given profit with another agent may prefer earning nothing than earning an unfairly low amount of money. Later, an influential strand of literature emerged on economic behavior which is driven by other motives than pure short-run own utility maximization.<sup>2</sup> Furthermore, in a principal-agent relationship, agents may have preferences on the competitiveness of the incentive scheme according to which they will be compensated. For example, it would be plausible to suspect that hyper-competitive incentive schemes may be negatively perceived by agents. This phenomenon has never been studied so far in the context of strategic delegation in oligopoly. This task is partially undertaken here, and this makes the present study interesting for researchers working on the design of incentives and delegation of different levels of decision making within collective decision making entities like firms which then compete with other entities of a similar

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<sup>2</sup>A sample of representative contributions from a plethora of recent papers is Andreoni (1988, 1990), Andreoni and Croson (2005), Berg et al. (1995), Camerer and Thaler (1995), Charness (2004), Cocharde et al. (2004), Croson (2000), Dufwenberg et al. (2001), Dufwenberg and Kirchsteiger (2004), Fehr and Gächter (1998), Fehr et al. (1998a,b), Fehr and Schmidt (1999), Gächter and Falk (2002), Gneezy et al. (2000), Güth et al. (1997, 2001), Hoffman et al. (1994, 1996), Levine (1998), McCabe et al. (2000, 2003), McCabe and Smith (2000) and Rabin (1993).

structure.

The chapter is organized in the following way: section 2.2 discusses the theoretical framework and presents the testable hypotheses. Section 2.3 presents the experimental design. Section 2.4 reports the results and the last section concludes.

## 2.2 The theoretical framework

In line with Manasakis et al. (2007), an industry that consists of two firms is considered, each producing one brand of a differentiated product. Firm  $i$  produces brand  $i$  in quantity  $q_i$ . Demand for the differentiated product is characterized by a symmetric linear demand system, where the inverse demand function for brand  $i$  is given by

$$P_i = A - q_i - \gamma q_j \quad (2.1)$$

where,  $\{i, j\} = \{1, 2\}$ ,  $i \neq j$ ,  $A > 0$  and  $\gamma \in [0, 1]$  is a measure of substitutability among brands, with the extreme cases of  $\gamma = 1$  and  $\gamma = 0$  corresponding to perfect substitutability and product independence respectively. It is further assumed that firms have the same constant unit cost  $c$ . Thus, firm  $i$ 's profits are given by:

$$\Pi_i = (A - q_i - \gamma q_j - c)q_i \quad (2.2)$$

In this industry, each firm has an owner and a manager. Following Fershtman and Judd (1987), the term owner, defines a decision maker whose objective is to maximize the profits of the firm. This could be the actual owner, a board of directors, or a chief executive officer. Managers are agents hired by owners to make real time operating decisions. Each owner can choose one among two different types of incentive contracts to compensate his manager: the first is the Profit-Revenue (PR) type of contract. Following Fershtman and Judd (1987) and Sklivas (1987), under this type of contract, the incentive structure takes a particular form: each risk-neutral manager  $i$  is paid at the margin, in proportion to a linear combination of own profits and revenues. More formally, firm  $i$ 's manager will be given incentives to maximize:

$$U_i^{PR} = a_i^{PR} \Pi_i + (1 - a_i^{PR}) R_i \quad (2.3)$$

where  $\Pi_i$  and  $R_i$  are firm  $i$ 's profits and revenues respectively and  $a_i^{PR}$  is the managerial incentive parameter that is chosen by owner  $i$ . From a theoretical point of view, since the manager's reward is linear in profits and sales, he is paid  $A_i + B_i U_i^{RP}$  for some constants  $A_i$ ,  $B_i$ , with  $B_i > 0$ . Since he is risk-neutral, he acts so as to maximize  $U_i^{RP}$  and the values of  $A_i$  and  $B_i$  are irrelevant. If  $a_i^{PR} < 1$ , firm  $i$ 's manager should move away from strict profit-maximization towards higher sales, thus, becoming a more aggressive seller in the market.

The second type of contract is the Relative Performance (RP) one. Following Miller and Pazgal (2001; 2002; 2005), under this contract, each owner  $i$  compensates his manager putting a weight of  $(1 - a_i^{RP})$  on own profits and a weight of  $a_i^{RP}$  on the difference between own profits and the profits of the rival firm, yielding a variable compensation to the manager of:

$$U_i^{RP} = a_i^{RP} \Pi_i + (1 - a_i^{RP}) [\Pi_i - \Pi_j] \quad (2.4)$$

When the objective function is written in this manner, it becomes apparent that if  $a_i^{RP} < 1$ , manager  $i$  puts negative weight on rival firm's performance. If  $a_i^{RP} = 1$  the manager's behavior coincides with standard own profit-maximization.

In order to examine which types of managerial incentive contracts prevail in equilibrium, a two-stage game with the following timing is considered: in the first stage, each owner chooses the type of contract to reward his manager and sets the corresponding managerial incentive parameter  $a_i$ . In contrast to the received literature, the postulate here is that there is no ex-ante commitment over the type of contract that each owner will offer to his manager. The crucial, yet (due to the symmetric industry) reasonable assumption here is that the precise contract (the type of contract and the managerial incentive parameter) that owner  $i$  sets is not observable by the rival owner, before contract-setting is everywhere completed. Thus, it is argued that each owner can independently shift from a Profit-Revenue (Relative Performance) contract, to a Relative Performance (Profit-Revenue) one. In the second stage of the game, given that the type of contract and the incentive parameter that each owner has chosen have become common knowledge and cannot be reset, managers compete setting quantities. An alternative assumption concerning the timing of the game and, thus, the strategic role of committing to a contract type is considered, according to which contract types are decided and observed before the terms of incentive contracts are chosen. This leads to a three stage game in which the choice



of contract type precedes the choice of contract terms, with output decided in the third stage.

Subgame perfection is used as the equilibrium concept to solve these games by backward induction.

First, the Universal Profit-Revenue scenario is investigated, in which both firms' owners choose a Profit-Revenue contract to compensate their managers. In this case, equilibrium managerial incentive parameter, output and profits are:

$$a_i^{PR*} = \frac{-A + 6c}{5c}, \quad q_i^{PR*} = \frac{2(A - c)}{5} \quad \text{and} \quad \Pi_i^{PR*} = \frac{2(A - c)^2}{25}. \quad (2.5)$$

Second, the Universal Relative-Performance is examined. The corresponding equilibrium values are now given by:

$$a_i^{RP*} = \frac{1}{3}, \quad q_i^{RP*} = \frac{3(A - c)}{8} \quad \text{and} \quad \Pi_i^{RP*} = \frac{3(A - c)^2}{32}. \quad (2.6)$$

Finally the Coexistence of the two types of contract is considered, in which, without loss of generality owner  $i$  is assumed to choose a Profit-Revenue contract, while his rival's choice is a Relative Performance one. The equilibrium outcome of the Coexistence scenario is given by

$$a_{i(j)}^{(pr-rp)*} = 1(0), \quad q_{i(j)}^{(pr-rp)*} = \frac{A - c}{4} \left( \frac{A - c}{2} \right) \quad \text{and} \quad \Pi_{i(j)}^{(pr-rp)*} = \frac{(A - c)^2}{16} \left( \frac{(A - c)^2}{8} \right) \quad (2.7)$$

The summary of the main findings given in eq.(2.5), (2.6) and (2.7), yield the hypotheses which will be tested with the present experimental design.<sup>3</sup>

First regarding the endogenous choice of managerial contracts, when owners commit to a contract before choosing the terms, a dominant strategy of both firms is to reward their managers under a Relative Performance type of contract. In the absence of commitment on contract type before the terms of incentive contracts are chosen, multiple equilibria exist corresponding to the universal adoption of either contract type. However, the Pareto criterion could be used to select the Relative Performance type as a focal equilibrium point. In terms of observable implications, this would lead to the following testable hypothesis:

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<sup>3</sup>Formal proofs and results obtained in this framework are presented and discussed in detail in Manasakis et al. (2007).

**TESTABLE HYPOTHESIS 1:** (H1.1) *Relative Performance incentives will be preferred over Profit-Revenue incentive schemes and (H1.2) this preference will be stronger if firms commit to an incentive contract type before deciding on the terms of the contract.*

Given each one of these two equilibrium points, the terms of the corresponding equilibrium incentives should be such that Relative Performance-rewarding owners choose their managers' objectives closer to profit maximization, while in the alternative Profit-Revenue equilibrium managers are asked to deviate more from pure profit-seeking behavior.

**TESTABLE HYPOTHESIS 2:** *The terms of incentives under universal adoption of each type of contract are such that managers under Relative Performance contracts are induced to adopt a less aggressive behavior than managers under Profit-Revenue incentives. In asymmetric configurations the reverse ranking is expected to be observed.*

Regarding the consequences of this prediction for the corresponding equilibrium outputs, it is shown that Profit-Revenue contracts lead to a higher individual and total output than Relative Performance contracts, which also explains why the universal Relative Performance equilibrium is more profitable than its Profit-Revenue counterpart. Contrary to this comparison of equilibrium outputs across the two symmetric contract choices, in asymmetric contract configurations the firm using Relative Performance incentives produces higher output than its Profit-Revenue-oriented rival.

This can be summarized in the following testable hypothesis:

**TESTABLE HYPOTHESIS 3:** *Compared to the case of universal Relative Performance contracts, output is higher under industry-wide adoption of Profit-Revenue incentives, while the contrary ranking of individual outputs is predicted within a duopoly in which the two contract types coexist.*

It is worth noting that if both firms chose no delegation at all they would end up earning higher profits than in any of the delegation scenarios discussed above. The reason for the emergence of symmetric delegation equilibria is straightforward: by using an incentive contract strategically, an owner directs his manager to a more aggressive behavior in order to force the competing manager to reduce output. Because each owner acts in the same way at the game contract stage, firms end up in a prisoners' dilemma situation. Naturally, the increase of market supply, in comparison to the no-delegation case, leads to lower profits in the incentive

equilibrium.

The intuition behind the prevalence of the Relative Performance equilibrium is based on the results observed in eq.(2.7). More specifically, the owner who selects Relative Performance type of contract for his manager, obtains competitive advantage in the market, provided that the rival owner chooses any different type of contract. This makes the selection of a Relative Performance managerial contract each owner's best response to whatever the rival owner's choice is. Hence, Relative Performance is the dominant owners' strategy.

## 2.3 Experimental design

The predictions of the theoretical framework outlined above, have been tested in a laboratory experiment.

A total of 144 subjects participated in the sessions. They were volunteers recruited among 2nd and 3rd course students enrolled in the Business and Human Resources degrees at the Universitat Jaume I according to standard protocols used in the *Laboratori d'Economia Experimental* (LEE) of the Universitat Jaume I (Castellón, Spain), where all the sessions reported here, were run. Real monetary incentives were used. Each session lasted approximately 100 minutes and average earnings per subject were slightly above 20 Euros.

The experiment was organized under two treatments. A total of four 36-subject sessions were run, two under each treatment. In the first treatment, labeled as *2-stage* game, owners choose simultaneously the type and the terms of their managers' incentive contracts before managers decide on their firms' output. In the second treatment, labeled as *3-stage*, the choice of contract type precedes the choice of contract terms and the corresponding decisions become public information before the contract terms are chosen by the owners and quantities are set by managers. The experiment was programmed using the z-Tree toolbox (Fischbacher, 1999). At the beginning of the session, each subject was randomly assigned the role of an owner or a manager and written instructions specific to each role were distributed to them. All remaining questions were privately answered by one of the organizers.

Eighteen owner-manager pairs were randomly formed once at the beginning of each session. These intra-firm pairs were kept fixed throughout the 50 periods of the session in order to

encourage the development of a cooperative relation between the agents who formed each firm. Nine pairs of firms were randomly formed in each period using a *strangers* matching protocol in order to preserve the one-shot nature of the market game. In order to increase the number of completely independent observations per session, matching occurred within three groups of 6 owner-manager pairs (firms), that is three independent matching groups of 12 subjects each. However, this precise detail was not known by the subjects who would have a further difficulty to guess the total group size and assess the likelihood of being re-matched with the same firm in two different periods, given that the computer network of the LEE is installed in two distant rooms between which there is no possibility of visual contact. No significant difference was found across matching groups within each treatment and, thus, data from the same treatment were pooled together. Following this design a total of three totally independent observations is guaranteed by the fact that strategies and the history experienced by each subject were never contaminated by nor did they contaminate decision making within the other two matching groups. Therefore, in a very strict statistical sense, the present conclusions are based on behavior within six totally independent groups per treatment.

Four independent sessions were run in two occasions on subsequent dates (18-19/12/2006 and 29-30/05/2007). The order between 2-stage and three stage treatment sessions was changed across the two occasions to control for any undesirable "social learning" across sessions creating misleading false treatment effects. Therefore, sessions 1 and 4 correspond to the 3-stage treatment, while sessions 2 and 3 belong to the 2-stage treatment.

The total cost for subject rewards was 2,739 euros which implies slightly above 19 euros per subject earnings, ranging between 7.3 and 29.6 euros (an owner subject in a three stage session and an owner-subject in a 2-stage session respectively). Subjects in the 2-stage treatment receive slightly higher payments than in the 3-stage one (19.3 and 18.7 euros respectively).

Given the experience from pilot sessions, the payment method was designed to yield similar earnings across player types.<sup>4</sup> Thus an equal split of the experimental earnings was observed in the overall sample and within each treatment. See instruction to the subject on this issue.<sup>5</sup>

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<sup>4</sup>See Appendix for instructions to the subjects on this issue.

<sup>5</sup>That is owners earnings were exactly 50% of total earnings in both the overall sample and the subsamples under treatments 1 and 2. Small variations of these percentage were observed across sessions (51% in session 1; 52% in session 2; 47% in session 3 and 48% in session 4).

The model's parameter values implemented here are:  $A = 1000$ ,  $\gamma = 1$  (homogeneous product) and  $c = 200$ . To compensate for possible negative earnings, a show-up fee of 10 Euros was given to each subject and it was uniformly distributed over the 50 periods in the form of a fixed amount  $f = 20,000 \text{ ExCus}$  (Experimental Currency Units) per period. Therefore, an exchange rate of 1 Euro per 80,000 ExCus was used.

Under this set of parameters the prediction for a non delegation Cournot equilibrium output is  $q_i^{\text{Cournot}} = 266.66$ . Given the prediction of the model concerning the contract choice stage, the contract terms and outputs corresponding to the two aforementioned perfect equilibria are examined. In the Universal Profit-Revenue equilibrium, both firms should choose  $a_i^{\text{PR}^*} = 1/5$  and managers should set the corresponding equilibrium output levels at  $q_i^{\text{PR}^*} = 320$ . In the Universal Relative Performance equilibrium, both firms' owners set  $a_i^{\text{RP}^*} = 2/3$ , leading to the corresponding equilibrium output level  $q_i^{\text{RP}^*} = 300$ . Although the combination of firm  $i$  choosing a Profit-Revenue contract while  $j$  chooses Relative Performance incentives is not an equilibrium, it is worth mentioning that the corresponding equilibrium contract terms and outputs are respectively  $(a_i^{\text{PR}}, a_j^{\text{RP}}, q_i^{\text{PR}}, q_j^{\text{RP}}) = (1, 0, 200, 400)$ .

A strict test of the theoretical model should aim at comparing the observed data on contract types, contract terms and outputs to the aforementioned theoretical predictions. However, any experimentalist would immediately recognize the difficulties associated with such a strict test of the theory, given that, unlike the usual theoretical assumption of perfectly informed human decision makers with unlimited calculus capacity and perfect foresight, real subjects learn from trial-and-error strategies and often commit systematic mistakes due to a number of reasons.<sup>6</sup> Thus, the test of the predictions provided in a qualitative form by the testable hypotheses H1-H3 stated in the previous section, follows.

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<sup>6</sup> A vast literature has been dedicated to various factors that may be responsible for observed shortcomings of human behavior in complex environments, such as misperception of feedback (Paich and Sterman, 1993 and Sterman 1994), limitations in subjects' learning when exposed to strategic complexity (Richards and Hays 1998), or multitask decision making (Kelly 1995). A number of factors that favor subjects' improvement of performance have, also, been identified. For example, trial-and-error algorithms have been shown to facilitate convergence of the strategies played by uninformed subjects toward symmetric, full-information equilibrium predictions, as shown in Garcia-Gallego (1998) for the case of a price-setting oligopoly. While full convergence near the theoretical single-product symmetric benchmark is obtained in settings such as that outlined in Garcia-Gallego (1998), the introduction of a slightly more complex task in the multiproduct oligopolies in Garcia-Gallego and Georgantzis (2001) or the asymmetry in Garcia-Gallego et al. (2004) provide a sufficiently unfavorable environment for the hypothesis based on the corresponding theoretical prediction to be rejected.

## 2.4 Results

Data analysis reveals two interesting results regarding the type of the contract that owners will choose for their managers. First, firms' owners will only rarely choose not to delegate any decisions to their managers.<sup>7</sup> This is in line with the theoretical prediction (See, Vickers (1985), Fershtman (1985), Fershtman and Judd (1987) and Sklivas (1987)), according to which owners will always choose strategic delegation in order to obtain competitive advantage in the market. Moreover this contradicts the experimental findings of Huck et al. (2004), according to which firms' owners' choice will in most cases be "No Delegation".

Treatment	2-Stage		3-Stage		Both	
Variable	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Quantity	357.00	97.99	354.43	91.97	355.72	95.02
Incentive Parameter ( $\alpha$ )	.498	.261	.523	.285	.510	.274
Type of contract	1.733	.442	1.709	.454	1.721	.448
Profits	30802.09	19598.56	32213.03	19387.36	31507.56	19503.3

Table 2-1: Descriptive statistics (overall sample). Profit-Revenue Contracts=1, Relative Performance Contracts=2.

Table 2-1 provides descriptive statistics on individual quantities, contract types and incentive parameter choices. From this information one can see that quantities have been, on average, significantly higher than expected, even if one compared the average output obtained (approximately, 355 in the overall sample, 357 in the 2-stage game and 354 in the 3-stage one), with the most expansive theoretical output prediction (320 product units) corresponding to the simultaneous adoption of Profit-Revenue contracts by both owners. In fact, under the present parameters, the other two scenarios (Universal Relative Performance and coexistence of both contract types) yield the same average output prediction (300 product units, although asymmetric contract configurations predict 400 for the Relative Performance-rewarding firm versus its Profit-Revenue oriented rival). Therefore, the subjects here, have behaved in an excessively

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<sup>7</sup>Only 6%(4%) of the contracts include No Delegation in the 2-Stage (3-stage) treatment.

pro-competitive way, far beyond the consequences predicted by the theoretical model for any of the scenarios studied. Given that the predictions of the model concerning the contract terms significantly vary across different scenarios, the behavior of subjects with respect to the contract parameter choice contingent to each specific scenario will be studied. However, a first look at the overall sample reveals some not necessarily innocuous attraction to the focal value of 0.5, which lies between the predictions of both the two symmetric equilibrium configurations (1/5 and 2/3) and the predictions of the asymmetric contract configuration (0 and 1). As said before, this will be discussed in more detail in tables presenting contract term decisions contingent to different contract configurations, but this observation concerning the attraction to "moderate" values of the parameter is useful to address a more general deviation observed contract terms from their corresponding theoretical values towards more central attractors. Among such attractors the value of 0.5 must be given special attention<sup>8</sup>.

		Type of Treatment		
		2-Stage	3-Stage	Total
Type of Contract	<b>Profits-Revenues (PR)</b>	.573	.616	.595
		.272	.287	.280
		480	523	1003
	<b>Relative Performance (RP)</b>	.470	.484	.477
		.252	.276	.264
		1320	1277	2597
<b>Total</b>	.498	.523	.510	
	.261	.285	.274	
	1800	1800	3600	

Table 2-2: Means, st.deviation of  $a$  and frequencies of contract types for both the 2-stage and 3-stage treatments.

Next, Table 2-2 is considered. Relative Performance contracts are more frequently used than Profit Revenue incentives under both treatments.<sup>9</sup> But what is really interesting is to see is weather the combination of contract choices is as predicted by the subgame perfect equilibria discussed above. As sown in Table 2-3, in the 3-stage treatment, more than half of

<sup>8</sup>See, for example, Sabater-Grande and Georgantzis (2002) where subjects offered a continuum of lotteries with winning probabilities ranging between 0 and 1 are found to have some non Expected Utility-compatible preference for probabilities near 0.5.

<sup>9</sup>480 vs. 1320 times in the 2-stage treatment and 523 vs.1277 times in the 3-stage treatment.

the experimental duopolies have taken place under universal Relative Performance incentive contracts (932/1800 = 51.7%). Contrary to this equilibrium, the Universal Profit-Revenue equilibrium receives scarce, if any, support (178/1800 = 9.8%) of all contract combinations observed.

Type of Contract		Firms' choice				Total
		i, j=PR	i, j=RP	i=PR, j=RP	i=RP, j=PR	
Profit-Revenue (PR)		.610	.	.619	.	.616
		.278	.	.291	.	.287
		178	0	345	0	523
Relative Performance (RP)		.	.484	.	.484	.484
		.	.276	.	.276	.276
		0	932	0	345	1277
Total		.610	.484	.619	.484	.523
		.278	.276	.291	.276	.285
		178	932	345	345	1800

Table 2-3: Means, st.deviation of  $a$  and frequencies of contract types for the 3-stage treatment.

In fact the frequency of Universal profit revenue contracts is approximately half the frequency of "out of equilibrium" coexistence of the two contract types in the same market.<sup>10</sup> This finding confirms the theoretical prediction in Manasakis et al. (2007) according to which owners will reward managers under a Relative Performance type of contract. However, while this is a clear confirmation of Testable Hypothesis 1 according to which Relative Performance contracts will be chosen more frequently due to the Pareto selection criterion as a focal equilibrium point, no evidence in favor of the second part of the hypothesis (H2) is found, concerning an increased likelihood of Relative Performance contracts in the 3-stage game. Specifically, against the aforementioned prediction, Table 2-1 indicates that the frequency of contract 2 is slightly higher (not significantly, though) in the 2-stage than in the 3-stage treatment. Therefore, the following important finding can be stated:

**RESULT 1:** *Relative Performance contracts are significantly more frequent than Profit-Revenue ones (H1.1), but (opposite to H1.2) the result does not depend on whether owners*

<sup>10</sup> A  $\chi^2$  test ( $p = 0.0001$ ) has been used to confirm the significance of the difference between the aforementioned observed frequencies and a random distribution of strategy pairs uniformly across the corresponding outcomes of the game in the contract stage.



*commit on contract types before the contract terms are chosen.*

This result indicates that the selection criterion proposed in the theoretical findings in Manasakis et al. (2007) is more powerful than the 2-stage vs. 3-stage approach in explaining the prevalence of the Universal Relative Performance equilibrium over its Profit-Revenue counterpart. In other words, the strategic importance of committing on a specific contract type loses ground against a rational selection of the Pareto-dominant equilibrium.

Next, the findings regarding the managerial incentive parameter,  $\alpha$ , for both contract types are presented. First, under Profit-Revenue contracts, higher  $\alpha$ 's are chosen by owners than those chosen under Relative Performance incentives<sup>11</sup> indicating that under such an incentive scheme, owners' intentions to commit to a less competitive behavior is also expressed by the choice of a higher  $\alpha$ , favoring behavior which is closer to standard profit maximization. However, the only prediction of the theoretical model which is supported by the observed contract terms is that, in asymmetric configurations, Profit-Revenue rewarding owners set higher  $\alpha$ 's than Relative Performance rewarding firms. On the contrary, symmetric configurations are such that owners rewarding their managers' Relative Performance set lower  $\alpha$ 's than owners in symmetric Profit Revenue reward configurations. Finally, taking into account the quantitative predictions under the set of the parameters implemented in the experiment (1/5 and 2/3 for Profit-Revenue and Relative Performance, respectively), one can observe that owners have exhibited less aggressive behavior in symmetric configurations, setting on average higher  $\alpha$ 's than predicted in the corresponding subgame perfect equilibria, while in the asymmetric case, less extreme  $\alpha$ 's have been adopted (0.61 and 0.48, respectively) than the predicted values (1 for Profit Revenue and 0 for Relative Performance contracts). The most striking pattern observed in the present data on contract terms is that even after observing the other firm's contract type, owners set on average almost the same  $\alpha$  independently of whether the other firm has committed to one or the other contract type. That is, the contract terms chosen by owners exhibit no differences in response to their rivals commitment on a given incentive scheme. The following result summarizes:

**RESULT 2:** 1. *The prediction of the model concerning a higher aggressiveness of Relative Performance-rewarding owners over their Profit-Revenue rivals is confirmed (partial confirma-*

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<sup>11</sup>Yielding an average of 0.57 vs. 0.47 in the 2-stage treatment and 0.61 vs. 0.48 in the 3-stage treatment.

tion of  $H2$ ). On the contrary, the prediction concerning the ranking of  $\alpha$ 's across symmetric configurations is not supported by the data obtained here. 2. There is a systematic deviation of observed  $\alpha$ 's from the corresponding theoretical values (upwards for both symmetric configurations and Relative-Performance incentives in asymmetric situations and downwards for Profit Revenue in the asymmetric case). 3. Observing one's rival's commitment on a given contract type does not affect the average  $\alpha$  used by either Relative Performance-rewarding owners (app.0.48) or Profit Revenue ones.

Finally, the effects of contract type and incentive parameters ( $\alpha$ 's) on market outcomes are examined. It is worth mentioning once more that output behavior has been excessively expansive far beyond any of the theoretical model's predictions. Several other theoretical predictions concerning output levels are partially or totally rejected. For example, the theoretical prediction of higher output under Profit-Revenue (Relative Performance) than in symmetric (asymmetric) configurations, is not verified by the experimental outcome. In fact, looking at Table 2-4 one can see that output has exhibited little if any responsiveness to variations in the contract structure, given that the only perceivable (though not statistically significant) difference is between the output averages of Relative Performance and Profit Revenue oriented managers. It has been already reported in the past that, contrary to Bertrand competition, learning in Cournot experimental markets exhibits modest degrees of convergence towards the corresponding theoretical predictions due to excessively competitive behavior and strategy volatility.<sup>12</sup> The present findings extend this lack of predictive power of the Cournot model over to multistage games and specifically to the lack of output responsiveness to different delegation contracts.

<b>Mean (st. deviation) of firms' quantity per contract type</b>	<b>Universal Profit-Revenue</b>	<b>Universal Relative Performance</b>	<b>Coexistence Scenario</b>
<b>Profit-Revenue</b>	354.2 (33.5)		354.9 (21.6)
<b>Relative Performance</b>		355.2 (14.5)	348.1 (25.6)

Table 2-4: Mean and standard deviation of firms' quantity per contract type.

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<sup>12</sup>See, for example, the sharp difference in the results obtained by Garcia-Gallego (1998) on learning in Bertrand oligopolies and those reported by Huck et al. (1999) on learning in experimental Cournot markets.

What is left is left now is to examine whether the terms of delegation contracts have produced the expected outcome on output. That is, whether a manager has responded in the expected way to his reward scheme. A simple test is to see if there is a negative relation between the  $\alpha$  parameter and the output chosen. This can be done by estimating a model in which the dependent variable is quantity and explanatory variables are treatment dummies and own contract term choices. In fact, two different models can be estimated simultaneously, one for each contract type. Thus, the specification of the model estimated is given by:

$$q_{it} = \beta_{it}^0 + \beta_{it}^1 * \alpha_{it} + \varepsilon_{it} \quad (2.8)$$

Table 2-5 presents results from the estimation of the model.

Results confirm the general prediction of a negative effect of  $\alpha$  on output except from the case of Profit-Revenue contracts in the 3-stage treatment, in which case the terms of the delegation contract have no impact on the managers' quantity choices. Specifically, if one examines Relative Performance contracts he observes that all coefficients' estimates are significant<sup>13</sup>. Managers react to their firms' incentive schemes in the expected way, setting higher quantities for lower  $\alpha$  parameters, in both treatments. However this is not always the case for Profit-Revenues incentives, given that, for the 3-stage treatment, the corresponding coefficient is not significantly different from zero.

		$\beta_{it}^0$ $\beta_{it}^1$	Std. Err.	P> t	[95% Conf. Interval]	
2-stage treatment	$\beta_{PRT}^0$	379.90	10.41	0.000	359.48	400.32
	$\beta_{PRT}^1$	-33.16	16.40	0.043	-65.35	-9.8
	$\beta_{RPT}^0$	364.70	5.70	0.000	353.52	375.88
	$\beta_{RPT}^1$	-19.34	10.66	0.070	-40.27	1.57
3-stage treatment	$\beta_{PRT}^0$	341.25	9.45	0.000	322.71	359.79
	$\beta_{PRT}^1$	5.72	13.89	0.680	-21.52	32.97
	$\beta_{RPT}^0$	381.25	5.15	0.000	371.15	391.36
	$\beta_{RPT}^1$	-47.19	9.23	0.000	-65.31	-29.08

Table 2-5: Estimates of the model given by eq.(8).

<sup>13</sup>At a 95% confidence interval, except for the estimate corresponding to Relative Performance contracts in the 2-Stage treatment, which is significant at a 90%.

Therefore, the prediction of the theoretical model concerning the effect of delegation contract terms on output is, generally speaking, confirmed. However, this contrasts with the lack of responsiveness of output to contract types reported above. Interestingly, this implies that managers care more about the specific contract terms they are given, than the contract type itself. Despite the obvious divergence between observed and theoretically optimal behavior, this reflects the fact that within the same contract type there may be sharp differences in a manager's perception of the competitiveness of a given delegation scheme, depending on the degree to which the owner is inducing aggressive behavior in the output stage. Therefore, the present results permit to disentangle two different levels of functioning of the delegation phenomenon. First, the contract type as a signal of intentions, which according to the present results does not, *per se*, cause a significant impact on output. Second, given a delegation contract, the terms of the delegation scheme induce, in most cases, output decisions which reflect a manager's response to his contract's terms in the expected direction.

Some final remarks concern specific patterns of individual manager's responses to their owner's contract term decisions. This can only be traced by looking at individual level data, but may be responsible for some apparent lack of response of outputs to delegation contract terms. It is argued that the reported low levels of significance or even lack of it in some of the estimated output-contract terms relationship may be the result of heterogeneous behavior by individual managers, which is lost when the data are aggregated in one sample.

Below in table 2-6, the patterns of output responses to contract terms by contract configuration are presented. Monotonic (M) responses are defined as those which imply a monotonic response, in the predicted direction of the average output per market with respect to increases in the contract term parameter. All other responses involving changes in the direction of the report or even persistence of a response direction opposite to that predicted by the model are defined as non monotonic (N) changes. This sheds light to interesting patterns in individual responses which cannot be captured by the aforementioned estimation results. It is observed that the most frequent pattern, by far, is N, which implies that in most markets average output has exhibited at least one kink, revealing non linear patterns of individual managers' response to their owners behavior. That is, in each manager's history one can identify that there is a

threshold value of the contract term parameter beyond which the manager "counteracts" to the owner's pretended "advice" of an over-competitive behavior through extreme deviations from plain profit maximization.

Hence, the following result holds

**RESULT 3:** 1. *Output is not responsive to the delegation contract type.* 2a. *The estimation of a model in which the dependent variable is quantity and explanatory variables are treatment dummies and own contract term choices, gives a relatively clear confirmation of the predicted relation between contract terms and output aggressiveness.* 2b. *However, this result does not hold good for the examination of individual market data.*

This observation should not be mistakenly interpreted as contradictory to the result of the model estimated above. In that model, output responses were reported to behave in the expected manner, based on aggregate output data and the assumption of a linear relation between the cause and the effect. The finding here is based on *individual* market data with at least one inconsistent tendency of output responses, paying special attention to this phenomenon as a qualitative fact, not as a tendency of aggregate output data.

Universal Profit-Revenue				Universal Relative Performance				Coexistence of both contract types scenario							
2-stage		3-stage		2-stage		3-stage		2-stage				3-stage			
								PR		RP		PR		RP	
M	N	M	N	M	N	M	N	M	N	M	N	M	N	M	N
1	8	1	8	2	7	3	6	1	8	2	7	2	7	0	9

Table 2-6: Number of markets (over 9) of patterns of average output response to contract terms. M="Monotonic" (as predicted by the theory); N="Non monotonic".

In most cases in which a non-monotonic pattern is observed, the latter is associated with extreme values of alpha like are those inducing complete deviation from plain profit maximization. In order to interpret this result, one must remember that manager subjects have no power to reply to their owners once the latter have chosen a contract term parameter. That is, managers cannot renegotiate their contract, nor can they reject a given delegation scheme. In

that sense, one must see the results presented here, in line with a more general set of findings from economic agents engaged in asymmetric situations like dictator, and especially, ultimatum games. There, it is usually found that subjects have other regarding preferences leading to fairness considerations. As a result, weaker agents tend to reject unfair offers, despite the fact that this leads them to lower (usually zero) payoffs.<sup>14</sup> Here, this may be the case with managers receiving an overcompetitive contract leading often to a war with the other firm's manager aiming at winning the race of who is going to produce more. Managers engaged in such a warfare realize that the only signal they can send to their firm's owner is producing an unprofitable output. Of course, this reduces their own profits too, but the message is clear: "I do not like overcompetitive incentive contracts". Such a loss of utility from excessively competitive environments has been reported in many different contexts, but, to my knowledge this is the first time that it has been reported in the context of oligopoly delegation.

An alternative way to accommodate this finding into the other-regarding preferences framework is by considering managers' compliance with their owners' preferred objectives as reciprocal behavior<sup>15</sup> aiming at rewarding them for choosing a contract which does not put excessive pro-competitive pressure on them when deciding their output decisions. In any case, a serious deviation of experimental results like the present from the theoretical framework is the little if any incidence of symmetric strategy profiles (in contracts, contract terms, and output choices) in observed behavior which is in sharp contrast with the theoretical predictions of total symmetry in symmetric contract configurations. Therefore, one should have in mind that, for example, in all the occasions of a Universal Relative Performance configuration there is a subject which receives a penalization (negative variable compensation contingent on relative profits) that might trigger regret and feelings of loss to the loser of the output race. These considerations suggest several natural extensions of this work in the future. On one hand, a theoretical model with more behavioral consideration might be helpful in order to bring the

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<sup>14</sup>See work on similar issues in different contexts by Camerer and Thaler (1995), Croson (1996) and, especially Fehr et al. (1998a), Gneezy et al. (2000) and the influential work by Fehr and Schmidt (1999) and Rabin (1993).

<sup>15</sup>An extensive literature exists on positive and negative reciprocity in many different contexts. Without pretending an exhaustive list, some representative examples are studies by Andreoni (1988 and 1990), Berg et al. (1995), Bolton and Ockenfels (2000), Boyd and Richerson (1989), Cocharde et al. (2004), Dufwenberg et al. (2001), Dufwenberg and Kirchsteiger (2004), Engelmann and Fischbacher (2002), Fehr and Gächter (1998), Fehr et al. (1998b), Gächter and Falk (2002), Güth et al. (2001), McCabe et al. (2003). More similar to our intrafirm relations context is the study by Charness (2004).

present framework closer to real world markets. Second, controlling for some of the behavioral factors described above could require designing a more complex environment, accounting for manager's willingness to sacrifice present earnings in order to cause their firms' owners to adopt more manager-friendly contracts. This task will be undertaken in the future.

## 2.5 Conclusions

So far, the experimental literature on strategic delegation is limited to a context of owners choosing the terms of an exogenously imposed profit-revenue incentive scheme.<sup>16</sup> Therefore, this experiment is, to my knowledge, the first to allow subjects to choose between two different incentive contract types independently and before the actual terms of the contract are chosen. Furthermore, contrary to the discrete strategy space used in the aforementioned experimental study to implement a reduced form of the underlying game, a finer grid in both the output choice stage and the preceding one in which the contract terms are chosen, have been used.

Following the theoretical outcome of Manasakis et al. (2007), the present chapter focuses on three main testable hypotheses. The first regards the type of contracts that owners will endogenously choose to compensate their managers. The second refers to the relation between the contract type and the degree of aggressiveness chosen by owners. Finally the correlation of the contract type and managerial incentives to the market outcomes. The main findings are that Relative Performance contracts are significantly more frequent than Profit-Revenue ones, but (opposite to theory) the result does not depend on whether owners commit on contract types before the contract terms are chosen. Secondly, the prediction of the model concerning a higher aggressiveness of Relative Performance-rewarding owners over their Profit-Revenue rivals is confirmed (partial confirmation of theory). On the contrary, the prediction concerning the ranking of  $\alpha$ 's across symmetric configurations is not supported by the data. Additionally there is a systematic deviation of observed  $\alpha$ 's from the corresponding theoretical values (upwards for both symmetric configurations and Relative-Performance incentives in asymmetric situations and downwards for Profit Revenue in the asymmetric case). Furthermore, observing one's rival's commitment on a given contract type does not affect the average  $\alpha$  used by either Relative

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<sup>16</sup>Huck et al. (2004).

Performance-rewarding owners, or Profit-Revenue ones. Finally, output is not responsive to the delegation contract type. However, results are ambiguous regarding the predicted relation between contract terms and output aggressiveness is obtained.

A possible explanation of the specific deviations of observed behavior from the predicted theoretical outcomes is sought in the fact that managers often counteract to excessively pro-competitive incentive scheme as a means of punishing their owners for their behavior aiming at receiving more manager-friendly incentives. This links the oligopoly delegation framework to a more behavioral approach by a large number of, mostly, experimental studies on other-regarding preferences concerning fairness and reciprocity. This is certainly an underinvestigated aspect of managerial incentives. Hopefully, this is the starting point for a re-consideration of oligopoly delegation towards frameworks inspired on the rapidly growing behavioral economics literature.

## **2.6 Appendix: Experimental instructions (translated from Spanish)**

### **2.6.1 Owner Instructions (2-stage treatment)**

Your decisions in this experiment will help us study human behavior in specific economic contexts. The experiment is financed by public research funds. Read these instructions carefully, taking into account that a better understanding of the decision making context will help you earn more money and generate more reliable and, thus, useful data.

You are the owner of one of the two firms selling a given product. You will delegate the output decision of your firm to a manager whom you have hired for this purpose.

You will have to decide on the reward method which your firm will adopt to remunerate your firm's manager. Your decisions in each period will become public information to all agents involved in the same market before output decisions are made. Managers will have to take these decisions as given and then fix their firm's output. Contracts may be of the following types:

Contract Type 1: 20.000 experimental monetary units (UMEX) as a fixed salary plus half of a linear combination between the firm's profits and the firm's revenues.

Choosing the value of alpha you can vary the weight given by your firm to each of these two objectives (profit and revenue) in the variable compensation of the firm's manager.



Contract Type 2: 20.000 experimental monetary units (UMEX) as a fixed salary plus half of a linear combination between the firm's profits and the difference between your firm's and the rival's profits.

Choosing the value of alpha you can vary the weight given by your firm to each of these two objectives (profit and revenue) in the variable compensation of the firm's manager.

When choosing the contract terms you should take into account that your earnings will be: a fixed amount of 20.000 UMEX plus the firm's profit minus your manager's variable earnings.

The market will take place for 50 subsequent periods. In each one of them, following your choice of contract and that of the rival firm's owner managers will make output decisions simultaneously choosing output levels ranging between 0 and 500 product units. You may change your manager's reward method every 3 periods during the first 30 periods and every period after period 30.

The manager of your firm will be randomly assigned to you once and will be kept fixed throughout the experiment. In each period, you will form a market with a (different) single rival firm which will be chosen randomly among the firms formed by the participants of this experiment in the same way as your firm.

Your objective is to maximize your cumulative compensation. The more UMEX you earn the higher will your payment in cash at the end of the session. We give you a fixed initial payment of 100.000 UMEX which will be added to your earnings from the experiment. The exchange rate is 1 euro for every 80,000 UMEX.

[Only for the 3-stage treatment: You and the owner of the rival firm will first know the contract chosen by each one of you and then you will decide on the value of alpha. Only after these two decisions have been made by owners, the managers receive information on contract types and alpha's chosen in order to make their firms output decisions.]

Thank you for your participation and remember that, once these instructions are read, any communication or action which is not controlled by the organizers is prohibited until payments in cash have been made at the end of the experiment.

## 2.6.2 Manager Instructions (both treatments)

Your decisions in this experiment will help us study human behavior in specific economic contexts. The experiment is financed by public research funds. Read these instructions carefully, taking into account that a better understanding of the decision making context will help you earn more money and generate more reliable and, thus, useful data.

You are the manager of one of the two firms selling a product in the market. The owner of the firm has hired you in order to delegate to you the decisions concerning the output of the firm.

The method with which you will be rewarded which you will have to take as given may be of either type:

Contract Type 1: 20.000 experimental currency units (UMEX) as a fixed salary plus a half of a linear combination between the profits and the revenues of the firm.

By choosing the value of alpha, the owner can vary the weight given to each one of the two aforementioned objectives in the variable part of your reward.

Contract Type 2: 20.000 experimental currency units (UMEX) as a fixed salary plus a half of a linear combination between the firm's profits and the difference between the firm's profits and the profits of the rival firm.

By choosing the value of alpha, the owner can vary the weight given to each one of the two aforementioned objectives in the variable part of your reward.

When receiving this information you should have in mind that the owner's earnings will be a fixed amount of 20.000 UMEX plus the firm's profit, minus the variable part of the owner's reward.

The market will take place during 50 periods in each one of which you will have to make the decision of your firm's output. The contract concerning your reward may be changed every three periods during the first 30 periods and every period after period 30.

You will be assigned to a firm's owner who will be randomly chosen once at the beginning of the experiment. This matching will be kept constant throughout the session. The firm with which your firm will be matched to form a market will be determined randomly in each period among the rest of the firms formed by the participants in this session in the same way as your firm.

Your objective is to maximize your cumulative compensation. The more UMEX you earn the higher will your payment in cash at the end of the session. We give you a fixed initial payment of 100.000 UMEX which will be added to your earnings from the experiment. The exchange rate is 1 euro for every 80,000 UMEX.

Thank you for your participation and remember that, once these instructions are read, any communication or action which is not controlled by the organizers is prohibited until payments in cash have been made at the end of the experiment.

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## Chapter 3

# Corporate Social Responsibility in Oligopoly

### 3.1 Introduction

This chapter has been motivated by the ongoing debate about the market bn welfare implications of Corporate Social Responsibility (CSR hereafter), that is, “*a concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with their stakeholders on voluntary basis*” (European Commission, 2001). This discussion was initiated by the rapid growth of firms like ‘The Body Shop’, whose products are strongly connected to social and ecological considerations. This is a well documented case of a CSR oriented company (Klein, 1999).<sup>1</sup> Moreover, recent stylized facts reveal that private firms make considerable efforts to become, or at least to appear as, socially responsible.<sup>2</sup>

Given this evidence, the question that arises is the following: “Why would the owner(s) of a private firm be willing to engage in activities that promote social values?”. The present chapter

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<sup>1</sup>Other well documented examples are corporations such as “Starbucks” and “Motorola”, which not only spend large amounts of money on CSR activities, but they also promote their socially responsible actions through frequent press releases. More specifically “Starbucks” puts emphasis upon the provision of financial support for social development in the cocoa growing communities. See: <http://www.starbucks.com/aboutus/csrannualreport.asp> (Date last visited: January, 15th 2008). In a similar vein, “Motorola” attempts to create an environmental concerned image, by financing recycling programs. See the “Motorola Global Corporate Citizenship Report”, at: <http://www.motorola.com/content.jsp?globalObjectId=8204-10392> (Date last visited: January, 15th 2008).

<sup>2</sup>More than half of the top 100 corporations in the 16 more industrialized countries published a CSR report in the year 2005 (Becchetti et al., 2006).

addresses and formalizes this question in an oligopolistic market for a final good, where CSR effort and market decisions are delegated from owners to “socially responsible” (SR hereforth) managers, while consumers differ with respect to their valuation towards CSR activities.

The basic idea behind the present model is that firms strategically engage in CSR activities in order to create a “socially friendly image” for their product. It is assumed that consumers are homogeneous regarding the physical characteristics of the goods, but heterogeneous towards the valuation of the CSR aspects of each product. More socially conscious consumers have higher valuation for the product of the firm that engages in CSR activities, hence, they are willing to pay a higher price for the “socially friendly” good.<sup>3</sup> This is the rational why some consumers show strong preference for “The Body Shop” products, even though these products are more expensive than other conventional cosmetics. On the other hand, engaging in CSR activities includes costly actions by the firm in order to operate in the interests of other stakeholders such as its employees (by improving working and safety conditions related to the production process), the broader community (by ordering more expensive inputs from local suppliers, by financing social events and by contributing to charities) and the environment (by introducing “green” technologies or by financing recycling programs).<sup>4</sup>

The present envisaged duopolistic market follows Häckner (2000) along with Garella and Petrakis (2008), using a utility function that combines horizontal and vertical differentiation aspects of firms’ products. The vertical differentiation represents the CSR aspects of the production process that are perceived as quality improvement of the final product by socially conscious consumers. In this context, firms’ owners have two alternative strategies: either to delegate market competition decisions to an “SR” manager, or not. This reflects a common practice in the real business world, that is employing a manager with a strong background in CSR activities to undertake not only the CSR activities, but also an active role in the overall decision making of the firm.<sup>5</sup> Delegation of authority from owners to “SR” managers is obviously

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<sup>3</sup>Becchetti et al. (2005) quote the “2003 Corporate Social Responsibility Survey”. The main finding of this survey is that the amount of consumers that are socially concerned on their purchasing choices was 62% in 2001 in Europe.

<sup>4</sup>See for example Mayer (1999) and Bris & Brisley (2006).

<sup>5</sup>For instance, in large corporations such as “Intel” or “Hewlett-Packard”, the announcement of hiring a socially responsible manager is accompanied with detailed report on his/hers previous SR activities and active position in the overall decision making within the firm. Visit: <http://blogs.intel.com/csr/authors> and <http://www.hp.com/hpinfo/globalcitizenship/gcreport/ethics/approach.html>

a signal about the CSR activity policy that the firm is intended to follow, which is, to a large extent, credible to the consumers. Without it, we assume that consumers do not believe that the firm engages in CSR. Hence it will increase consumers' valuation for their firm's product.

The idea of firms' owners employing managers with different objectives than strict profit-maximization, in order to achieve competitive advantage against their rivals, has been formalized in the theory of *strategic managerial delegation*.<sup>6</sup> Following Miller and Pazgal (2001; 2002; 2005) it is further considered that potential managers have a range of different stances towards CSR and this is captured by their "type". Each manager tries to maximize his utility which is the sum of his firm's profits plus the additional utility of engaging in CSR activities. The main point is that each manager is committed to his own type, and by employing him, firm's owners do commit to CSR of that type also. Therefore, delegation may be strategically used by a strict profit-maximizing owner so as to strengthen his firm's competitive position in the market.

Three candidate equilibrium configurations are considered. The first is the *Universal CSR* in which both firms' owners employ an SR manager (thus they engage in CSR activities). The second is the *Asymmetric case* where only one owner hires an SR manager, while his rival does not hire a manager and thus does not undertake any CSR activities. The third refers to the *No CSR case*, in which no owner hires an SR manager. The main finding is that in equilibrium, each firm's owner employs an SR manager, because by doing so he has the opportunity to increase his profits by obtaining competitive advantage. This interaction causes owners to strategically hire managers who undertake CSR activities.

Thus, Universal CSR is the only endogenously emerging equilibrium. Any unilateral deviation from the Universal CSR configuration, would result the deviant firm to earn lower profits than those earned previously, since in equilibrium output and profits under CSR activities are always higher compared to the benchmark case without CSR efforts. With respect to the societal effects of CSR activities, the strategic behavior of owners hiring SR managers increases

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(date last visited: January, 15th 2008).

<sup>6</sup>Vickers (1985), Fershtman and Judd (1987) and Sklivas (1987) investigate the effects of distorting managerial preferences away from strict profit-maximization towards including consideration of sales. More recently, Miller and Pazgal (2001; 2002; 2005) formalize the idea that in oligopolistic markets a firm's owner may increase his firm's profitability by hiring a manager who, besides his own firm's profits is also concerned with the rival firms' profits when he competes in the market.

consumers' surplus and total welfare too.<sup>7</sup>

The findings in this chapter, contribute to the existing literature on “strategic CSR”, a term that was introduced by the seminal work of Baron (2001) and refers to the case where firms are assumed to be socially responsible because they anticipate a benefit from such a behavior. Baron (2001, 2003) examines CSR under the prism of private politics. His main finding is that private politics and CSR can affect the strategic position of a firm in an industry under the existence of activist consumers, who can boycott firms with non-socially friendly behavior. In the same vein, Calveras et al. (2006), assuming a perfectly competitive supply of inputs, compare the effects of formal regulation to firms incentives to provide socially friendly goods as a response to increased activism on behalf of consumers. They argue that substituting formal regulation with firms CSR actions may cause an inefficiency, in which non activist consumers free-ride the willingness to pay of activist consumers, lowering formal regulation. More recently, Baron (2008), in a principal-agent context, argues that firms may include social incentives to managers besides profit maximization, only if consumers and investors reward a firm for social spending. However, the present analysis departs from Baron (2008), since it concentrates on the strategic use of corporate social responsibility in imperfectly competitive markets.

McWilliams and Siegel (2001) model firms' incentives to engage in CSR activities in oligopolistic markets with homogeneous goods. In the context of the Resource Based View of the firm, managers conduct cost-benefit analysis to determine the level of firms' resources that should be allocated to CSR activities. They argue that firms undertaking CSR activities will earn profits equal to those earned by their strictly profit-maximizing rivals.<sup>8</sup> Bagnoli and Watts (2003) examine the case in which an oligopolistic firm links the provision of a public good (such as CSR activities) to the sale of their private product, in the context of unit demands and homogeneous socially responsible consumers. They find that the provision of CSR by firms is negatively related to the number of the firms in the market and positively related to the consumers' willingness to pay for the supply of the public good.<sup>9</sup> The present chapter, focuses

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<sup>7</sup>Note that the results in the present model do not change qualitatively when only CSR effort decisions are delegated to socially responsible managers, while market competition decisions are taken by owners. However as mentioned above, this is not the case in the real business world where socially responsible managers do have an active role in the overall decision making of firms.

<sup>8</sup>McWilliams and Siegel (2001) refer to this outcome as the “Neutrality Result”.

<sup>9</sup>See Viviani (2006) and McWilliams and Siegel (2006) for a survey on the subject.

on the strategic interactions that arise between oligopolistic firms engaging in CSR activities by assuming heterogeneous consumers towards CSR and individual consumers can buy in variable quantities from both brands.

Unlike the present chapter, the vast majority of the literature on quality differentiation is based on the seminal paper by Gabszewich and Thisse (1979) and concentrates on oligopolistic models in which firms' products differ only in their vertical quality characteristics, which are observable by consumers. In the present chapter, following Häckner (2000) along with Garella and Petrakis (2008), a utility function that combines horizontal and vertical differentiation aspects of firms' products is used (see also Daughety and Reinganum, 2005, Garella and Fluet, 2002). Additionally, since CSR is considered as credence good it is assumed that there is no ex ante mechanism that can credibly inform consumers about the CSR characteristics of each product. Furthermore, in the aforementioned literature the cost to increase quality is assumed to be zero, or fixed. The present chapter contributes on this branch of the literature assuming that engaging in CSR increases variable costs.

The rest of the chapter is organized as follows. The next section introduces the model. In section 3.3 owners' incentives to hire an SR manager are investigated, while in section 3.4 welfare analysis is conducted. Section 3.5 examines how the existence of fixed costs regarding CSR activities may effect the results. Finally, section 3.6 concludes.

## 3.2 The Model

The market assumed here, consists of two firms, denoted by  $i, j = 1, 2, i \neq j$ , each producing one brand of a differentiated good. On the demand side, there is a *unit mass* of consumers composed by individuals who have identical preferences regarding the physical characteristics of the goods. They are, however, heterogeneous regarding their valuation of the CSR activities undertaken by the firm that produces the good. In particular, following Häckner (2000), the utility function of the  $\theta$ -type consumer is given by:

$$U(\theta) = (a + \theta s_i^e)x_i(\theta) + (a + \theta s_j^e)x_j(\theta) - [x_i^2(\theta) + x_j^2(\theta) + 2\gamma x_i(\theta)x_j(\theta)]/2 + m(\theta) \quad (3.1)$$

where  $x_i(\theta)$ ,  $i = 1, 2$ , represents the quantity of good  $i$  bought by the  $\theta$ -type consumer and  $m(\theta)$  is the respective quantity of the “composite good”. The parameter  $\gamma \in [0, 1]$  is a measure of the degree of substitutability, with  $\gamma = 0$  corresponding to the case of independent goods and  $\gamma = 1$  to that of homogeneous goods. Further,  $s_i^e \geq 0$  represents the consumers’ expectations regarding firm  $i$ ’s CSR effort which, in turn, increases the  $\theta$ -type consumer’s valuation for its good by  $\theta s_i^e$ . Equivalently,  $\theta$  represents the increase of  $\theta$ -type consumer’s willingness to pay for the firm  $i$ ’s good per unit of expected CSR effort by firm  $i$ . Thus, the more socially conscious a consumer is, the higher is his  $\theta$ . While a consumer who does not value the firms’ CSR activities at all is of type  $\theta = 0$ . It is assumed that  $\theta$  is distributed according to a cumulative distribution function  $F(\theta)$ , with density function  $f(\theta)$ , where  $\theta \in [0, 1]$ . Thus,  $\bar{\theta} = \int_0^1 \theta f(\theta) d\theta$  represents the average type of consumer in the population.

Maximization of utility (3.1) with respect to  $x_i(\theta)$  and  $x_j(\theta)$  gives the (inverse) demand functions for the  $\theta$ -type consumer:

$$p_i = a + \theta s_i^e - x_i(\theta) - \gamma x_j(\theta) \quad (3.2)$$

where  $p_i$  and  $p_j$  are the firms’ prices, while the price of the composite good has been normalized to unity. By inverting (3.2) one obtains the  $\theta$ -type consumer’s demand for good  $i$ :

$$x_i(\theta) = \frac{a(1 - \gamma) + \theta(s_i^e - \gamma s_j^e) - p_i + \gamma p_j}{1 - \gamma^2} \quad (3.3)$$

By integrating (3.3) with respect to  $\theta$ , one gets firm  $i$ ’s aggregate demand function:

$$q_i(p_i, p_j) = \int_0^1 x_i(\theta) f(\theta) d\theta = \frac{a(1 - \gamma) + \bar{\theta}(s_i^e - \gamma s_j^e) - p_i + \gamma p_j}{1 - \gamma^2} \quad (3.4)$$

Finally, by inverting (3.4), firm  $i$ ’s (inverse) aggregate demand function, is obtained:

$$p_i(q_i, q_j) = a + \bar{\theta} s_i^e - q_i - \gamma q_j \quad (3.5)$$

Observe that the aggregate demand function is positively connected to the average type consumer,  $\bar{\theta}$ , and the expected CSR effort by consumers, given by  $s_i^e$ . This reflects the main idea

of the present model, that is, if socially conscious consumers are convinced about the positive CSR effort by a firm, they increase their valuation for its product. Thus the aggregate demand for this product is increased.

It assumed that both firms are endowed with identical constant returns to scale production technologies. Firm  $i$ 's total cost function is given by  $C_i(q_i, s_i) = c(1 + s_i^2)q_i$ . This implies that for a given CSR effort, represented by  $s_i$ , the firm  $i$ 's marginal (and average) production cost is constant and equal to  $c(1 + s_i^2)$ . Yet, a higher CSR effort increases, at an increasing rate, firm  $i$ 's unit production costs. This can be justified on the grounds that an individual firm's level of CSR activities, such as improving working conditions for employees, buying more expensive inputs from local suppliers, financing recycling and other SR campaigns, introducing "green" technologies, has an increasingly negative impact on the firm's unit production costs.<sup>10</sup>

Firm  $i$ 's profits can then be expressed as:

$$\Pi_i = (a + \bar{\theta}s_i^e - q_i - \gamma q_j)q_i - c(1 + s_i^2)q_i \quad (3.6)$$

Therefore, CSR activities by firm  $i$ , once they are correctly anticipated ( $s_i = s_i^e$ ), lead to higher consumers' valuation for its product and thus to higher aggregate demand for firm  $i$ 's final good. At the same time, CSR activities increase firm  $i$ 's unit and total production costs. Note however that the SR attributes that are attached to a product through firms' CSR efforts, are difficult if not impossible to be observed by consumers, even after consumption. Thus the SR quality of a product can be categorized as a credence good. In this setup a "market of lemons" problem may arise. Once consumers have been convinced that firm  $i$  has undertaken CSR effort  $s_i^e = s_i$ , and have thus increased their willingness to pay for the firm's good, the firm has no incentives to spend on CSR activities as these are costly for the firm. Consumers realize the firm's incentives and thus rationally believe that there will be zero CSR activity ( $s_i^e = 0$ ). The firm, in turn, spends zero on CSR activities in equilibrium ( $s_i^e = s_i = 0$ ).

To solve for the ensuing lemons problem, the literature on the internal organization of the firm is considered, after having paid attention to the widespread real world practices revealing

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<sup>10</sup>One could argue that there also are potential benefits on firms costs, from engaging in CSR, which are not formalized in the present model. For instance introducing a "green" technology may lead to decreased expenses for costly inputs such as electricity or petrol in the long term. However introducing the aforementioned cost reduction due to CSR would not change the results qualitatively.

that large corporations often hire socially responsible managers to undertake CSR effort. In fact, in large corporations such as “Intel” or “Hewlett-Packard”, the announcement of hiring a socially responsible manager is accompanied by a detailed report on his/hers previous SR activities. These announcements are obviously signals about the CSR activity policy that the firm is intended to follow, which, to a large extent, are credible to its potential consumers.

It is thus assumed that each firm can have an owner and a manager. The “owner”, which could be the actual owner, the board of directors, or a chief executive officer, has an objective to maximize the firm’s profits. On the other hand, the “manager” refers to an agent that the owner hires to make real time operating decisions, and could maximize profits or act according to a personal objective function (see e.g. Fershtman and Judd, 1987). It is assumed that the owner of firm  $i$  has the option to hire a specific CSR-type manager (as reflected on his curriculum of past SR activities) and delegate to him CSR activities as well as market competition decisions.<sup>11</sup> Potential managers take on a continuum of attitudes towards CSR activities that are captured by their type and by hiring them, profit-maximizing owners are committed to a certain behavior towards CSR. In particular, a manager of type  $t_i > 0$ , has a utility function of the form:

$$M_i(t_i) = \Pi_i + \tau_i c \frac{s_i^2}{2} q_i \quad (3.7)$$

That is, a  $\tau_i$ -type manager derives utility not only from the firm  $i$ ’s profits but also from its own CSR activities within the firm.<sup>12</sup> Following Benabou and Tirole (2006) and Calveras et al. (2006), this extra utility has its source to intrinsic and reputational incentives of individual agents. Note that the extra personal welfare of the manager is increasing, at an increasing rate, in the level of the CSR activities per unit of output produced by the firm.<sup>13</sup>

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<sup>11</sup>This is in line with Miller and Pazgal (2001, 2002, 2005), who suggested that a firm’s owner chooses a manager whose attitude fits to his own competitive goals.

<sup>12</sup>In contrast to Baron (2008), managers are selected with respect to their attitude towards CSR, revealed from their previous SR actions. This is in accordance with the existence of heterogeneous socially conscious consumers in the population. One can think that consumers and managers are drawn from the same population of economic agents who value the CSR activities embodied in the production process of a good. While consumers’ utility increases through their purchasing behavior, managers’ personal welfare increases through their production process decisions.

<sup>13</sup>While consumers’ utility increases at a constant rate with the level of the firm’s CSR activities (see (4.1)), the managers’ extra welfare is increasing, at an increasing rate. This can be justified on the grounds that managers have built their curriculum on the basis of their SR behavior and thus care more about the level of CSR effort undertaken by the firm. Note however that our results will not change qualitatively under the alternative scenario in which consumers’ extra utility has the same form as in (3.7).



This reflects the fact that the additional personal satisfaction of the manager for a unit increase in the firm’s CSR activities is higher, the higher is the level of the current CSR activity. Clearly, when the firm’s CSR activity is almost null, a small increase of this activity does not contribute much to the manager’s personal welfare. Note also that, hiring a manager who is not socially responsible ( $\tau_i = 0$ ) makes no sense, since a firm’s owner is unable to solve the ensuing lemons problem in this way. A firm  $i$ ’s owner, however, has the option not to hire any manager, in which case the level of its CSR activity is optimally set to zero,  $s_i = 0$ .

Furthermore, in (3.7) there is an implicit assumption that owners offer to their (risk neutral) managers “take it or leave it” incentive contracts. It is assumed, however, that these contracts cannot touch upon the extra personal utility that the managers obtain from the CSR activities. This, in turn, implies that the owner asks from the manager a franchise fee equal to  $\Pi_i$  and makes the manager “residual claimant” of the net revenues of the firm’s operations.<sup>14</sup>

A three-stage game, is considered. In the first stage, both firms’ owners, simultaneously and independently, decide whether to hire a manager or not. If an owner hires a certain  $\tau_i$ -type of manager, the owner announces  $\tau_i$  making it public information.<sup>15,16</sup> In the second stage, in case that an owner has hired a manager the latter sets the level of the firm’s CSR effort and competes in the market by setting quantity. Otherwise, the owner does not undertake any CSR activity, and decides himself over quantity. In the last stage, consumers form beliefs on firms’ CSR effort based upon the type of the managers hired (hence, if an owner does not hire

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<sup>14</sup>Although in real life the terms of managerial contracts are often determined via owners-managers negotiations, it is a standard assumption in the strategic delegation literature that the market for managers is perfectly competitive and the owners have all the power during negotiations and thus offer “take it or leave it” incentive contracts to their managers (see Vickers, 1985; Fershtman and Judd, 1987; and Sklivas, 1987). In our model the market for managers may not be perfectly competitive, because each manager is characterized by a *unique* curriculum with its previous SR activity (in line with Miller and Pazgal, 2001, 2002, 2005). This could justify our assumption that the owners are unable to extract the extra utility of the manager from his/her CSR activities within the firm. In addition, it could be reasonable to assume that the manager gets a share of the firm’s profits (besides its personal satisfaction). In this case the results will be sensitive to the distribution of power between the owner and the manager.

<sup>15</sup>As it has been cited in the introduction, large corporations, when hiring a socially responsible manager, do announce it through a detailed report on his/hers previous SR activities.

<sup>16</sup>Note also that if owners do not hire managers, this is also observable by consumers and the rival firm. The observability assumption is essential in order for delegation to have strategic value. Katz (1991) argues that unobservable contracts have no commitment value at all. Nevertheless, Fershtman and Judd (1987) support that even if contracts are unobservable, they will become common knowledge when the game is being repeated for several periods. More recently, Kockesen and Ok (2004) argue that, to the extent that renegotiation is costly and/or limited, in a general class of economic settings, strategic aspects of delegation may play an important role in contract design, even if the contracts are completely unobservable.

a manager, consumers believe that the firm will undertake zero CSR effort). Thus, consumers can infer the equilibrium value of  $s_i$  by inverting the strategies enacted by managers (and owners). Furthermore, since managers do not cheat consumers by assumption, it is not of much use to describe the equilibrium consumers' belief function in detail, by noticing that the equilibrium values of  $s_i$  is revealed from the observation of the managers'  $\tau$ .<sup>17</sup> The game is solved by applying the Perfect Bayesian Equilibrium (PBE) solution concept.<sup>18</sup>

### 3.2.1 The Benchmark case: No CSR activities

The analysis begins by briefly discussing the benchmark case, where no owner hires a manager. This is a standard Cournot game with differentiated goods, where each owner chooses its output to maximize profits,  $\Pi_i = (a - q_i - \gamma q_j)q_i - cq_i$ . From the first order condition, the reaction function of owner  $i$  is,

$$q_i = R_i^C(q_j) = \frac{a - \gamma q_j - c}{2} \quad (3.8)$$

By symmetry, the equilibrium output, price and profits are, respectively,

$$q^C = \frac{a - c}{2 + \gamma}; \quad p^C = \frac{a + (1 + \gamma)c}{2 + \gamma}; \quad \pi^C = \frac{(a - c)^2}{(2 + \gamma)^2} \quad (3.9)$$

Finally, since all consumers have identical preferences over the physical characteristics of the two goods and there is a unit mass of them in the population, it turns out that each consumer buys a quantity  $x^C = q^C$  from each good. Using (3.1) and (3.9), it can be checked that total welfare is given by  $TW^C = (q^C)^2(3 + \gamma)$ .

## 3.3 Equilibrium Incentives for CSR Activities

### 3.3.1 The Universal CSR case

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<sup>17</sup>A complete description is technically needed for the definition of a PBE. In our case such a description would involve beliefs stating that, for instance, if firm  $i$ 's quantity does not correspond to the equilibrium one, given the observed  $\tau$ 's, consumers would believe that  $s_i$  is equal to zero for that firm.

<sup>18</sup>The game is formalized in three stages, because it is assumed that the CSR activities of each manager are not observable by the rival firm. This is in line with the fact that it is very difficult to monitor the CSR activities of the firm. If one rather assumes that these activities are observable, he should formalize the game in four stages. Technically speaking, the above games give identical results.

Next, the analysis is conducted by assuming that both firms' owners choose to delegate CSR and output decisions to socially responsible managers. Then, it is checked, whether or not this is an equilibrium configuration. If no owner has an incentive to deviate towards pure profit-maximization (i.e. not to hire a manager), *Universal CSR* is an equilibrium configuration.

In the last stage of the game, consumers form beliefs on  $s_i$  and  $s_j$  based upon  $\tau_i$  and  $\tau_j$  set in stage one.

In the second stage, managers choose CSR effort and engage in quantity competition. Manager  $i$  sets  $s_i$  and  $q_i$  to maximize his utility (3.7), taking as given the CSR effort  $s_j$  and output  $q_j$  that his rival manager of type  $\tau_j$  sets.

The first order condition (foc) of (3.7) with respect to  $s_i$  and  $q_i$  leads to the manager  $i$ 's reaction function regarding CSR effort and quantities respectively:

$$s_i = R_i^{SR}(s_j) = \frac{\bar{\theta}}{c(2 - \tau_i)} \quad q_i = R_i^{SR}(q_j) = \frac{a - c - \gamma q_j}{2} + \frac{2\bar{\theta}s_i - cs_i^2(2 - \tau_i)}{4} \quad (3.10)$$

From (3.10) it can be seen that the reaction function of CSR effort of firm  $i$  ( $R_i^{SR}(s_j)$ ) does not depend on the CSR effort of the rival firm. Comparing  $R_i^{SR}(q_j)$  to the benchmark case with no CSR activities  $R_i^C(q_j)$ , in which only the first term of the RHS of (3.10) appears, one observes that CSR effort has two opposing effects on manager  $i$ 's output decision. On the one hand, CSR effort  $s_i$  augments the demand for the firm  $i$ 's good and thus tends to increase equilibrium output, by shifting  $R_i^{SR}(q_j)$  outwards. On the other hand, it increases firm  $i$ 's unit costs, tending to decrease equilibrium output, by shifting  $R_i^{SR}(q_j)$  inwards. Now if  $s_i < 2\bar{\theta}/c(2 - \tau_i)$  and  $\tau_i < 2$ ,<sup>19</sup> the first effect is dominant and the CSR effort undertaken by firm  $i$  in the previous stage, makes its manager more aggressive during the output competition stage (i.e. it shifts firm  $i$ 's reaction function outwards).

Solving the system of focs, the equilibrium CSR effort and output are obtained:

$$s_i^{SR}(\tau_i) = \frac{\bar{\theta}}{c(2 - \tau_i)} \quad q_i^{SR}(\tau_i, \tau_j) = \frac{a - c}{2 + \gamma} + \frac{\bar{\theta}^2[2(2 - \tau_j) - \gamma(2 - \tau_i)]}{2c(4 - \gamma^2)(2 - \tau_i)(2 - \tau_j)} \quad (3.11)$$

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<sup>19</sup>This is in fact the case in equilibrium - see below.

Clearly, the more SR the manager is, the higher is the equilibrium CSR effort. Further, the CSR effort increases with the social consciousness of the average consumer type  $\bar{\theta}$ , while it decreases with the degree of inefficiency of the CSR “production technology” (as captured by a higher  $c$ ). Finally, note from (3.11) that an SR manager optimally sets the level of CSR effort that makes the firm more aggressive during the output competition stage, as compared to the case where output level is chosen by profit-maximizing owners, that is  $s_i^{SR} < 2\bar{\theta}/c(2 - \tau_i)$ . The intuition is as follows. The manager  $i$ 's objective function consists of the firm  $i$ 's profits plus the extra utility from his engagement in CSR activities. Hence, by setting a CSR effort such that firm  $i$  gains a competitive advantage in the output competition stage, manager  $i$  not only enjoys higher extra utility due to higher output, but also increases firm  $i$ 's profits.

Observe, also, that firm  $i$ 's equilibrium output increases with  $\tau_i$ , while it decreases with  $\tau_j$ . The more SR the manager of firm  $i$  is (higher  $\tau_i$ ) and the higher the firm  $i$ 's CSR effort  $s_i$  is, the higher will be the firm  $i$ 's output. This is so because the manager then enjoys a higher extra utility per unit of output produced by firm  $i$ . On the other hand, when the rival manager is of higher  $\tau_j$ -type and sets thus a higher output for firm  $j$ , firm  $i$ 's manager optimally reacts by reducing its output (due to the strategic substitutability of decision variables). A similar reasoning applies when firm  $j$ 's CSR effort becomes higher, in which case its manager has incentives to increase firm  $j$ 's output because he enjoys a higher extra utility per unit of output produced.

In the first stage, owner  $i$  chooses the type  $\tau_i^{SR}$  of manager to hire in order to maximize his profits, which from (3.7) can be expressed as:

$$\Pi_i^{SR} = [q_i^{SR}(s_i^{SR}(\tau_i), s_j^{SR}(\tau_j))]^2 - \tau_i \frac{[s_i^{SR}(\tau_i)]^2}{2} q_i^{SR}(s_i^{SR}(\tau_i), s_j^{SR}(\tau_j)) \quad (3.12)$$

Solving the foc of (3.12), and exploiting symmetry, the type of manager that will be hired in equilibrium is obtained:

$$\tau_i^{SR} = \tau_j^{SR} = \tau_j^{SR} = \frac{32c(a-c) + \bar{\theta}^2(12 + 2\gamma - \gamma^2) - B}{4c(a-c)(8 - \gamma^2)} > 0 \quad (3.13)$$

where:

$$B = \sqrt{16c(a-c)[4c(a-c)(4 - \gamma^2)^2 + \bar{\theta}^2(2 + \gamma)(28 - 10\gamma + \gamma^2)] + \bar{\theta}^4(12 + 2\gamma - \gamma^2)}.$$

It can be checked that  $0 < \tau^{SR} < 1$ . That is, in equilibrium, both firms' owners hire socially responsible managers. The intuition is straightforward. Each owner, by delegating CSR effort and output decisions to an SR manager, has the opportunity to obtain a competitive advantage in the market against the rival firm, provided that the rival owner does not hire an SR manager. This is so because an SR manager would set output and CSR effort at a higher level than the owner himself, since in this way the manager enjoys a higher utility. In equilibrium, both owners act in the same way.

Plugging  $\tau^{SR}$  into (3.12), (3.11), (3.4) and (3.6) one obtains the equilibrium values for the CSR effort, output, price and profits, respectively,

$$s^{SR} = \frac{\bar{\theta}}{c(2 - \tau^{SR})}; \quad q^{SR} = \frac{2(a - c) + \bar{\theta}s^{SR}}{2(2 + \gamma)} \quad (3.14)$$

$$p^{SR} = \frac{2[a + c(1 + \gamma)] + (3 + \gamma)\bar{\theta}s^{SR}}{2(2 + \gamma)} \quad (3.15)$$

$$\Pi^{SR} = \frac{[2(a - c) + \bar{\theta}s^{SR}][2(a - c) + \bar{\theta}s^{SR} - (2 + \gamma)\tau^{SR}(s^{SR})^2]}{4(2 + \gamma)^2} \quad (3.16)$$

By comparing the equilibrium outcomes of the Universal CSR case with the benchmark case without CSR activities, it is found that  $q^{SR} > q^C$  always holds. Hence, in equilibrium, managers will set output at a level higher than that chosen by profit-maximizing owners. Moreover,  $\Pi^{SR} > \pi^C$  always holds. Intuitively, firms' profits are affected by three effects. First, since CSR activities are evaluated by consumers positively, these activities increase demand and revenues for the CSR related products. Second, since managers enjoy extra utility by their CSR activities, they push for higher CSR effort, increasing thus the firms' unit and overall costs. Third, higher output by both firms increases market competition, decreasing profits. The first effect is the dominant in equilibrium and thus profits are higher under Universal CSR. The following lemma summarizes:

**Lemma 1:** *Equilibrium output and profits under Universal CSR are always higher than under the benchmark case without CSR activities.*

Nevertheless, Universal CSR is an equilibrium configuration only if no owner has incentives

to unilaterally deviate by not hiring a manager. Let firm 1's owner stick to the (candidate) equilibrium behavior, i.e. he delegates output and CSR effort decisions to an SR manager of type  $\tau^{SR}$ . Does firm 2's owner has an incentive to deviate by not hiring a manager? In this case he will optimally choose to set  $s_2^d = 0$  in the following CSR effort selection stage of the game. It is then easy to see that by plugging  $\tau_2^d = s_2^d = 0$  in (3.11) and (3.12) one can obtain the deviant firm 2's profits,  $\Pi_2^d$ . By comparing  $\Pi_2^d$  to the one obtained in Universal CSR one finds that  $\Pi_2^d < \Pi^{SR}$  always. Hence, there are no incentives for deviation and Universal CSR is an equilibrium configuration, as the following Proposition states:

**Proposition 1:** *Universal CSR is always an equilibrium configuration.*

The intuition behind this result goes as follows. By hiring an SR manager, each owner strategically uses the SR characteristics of his manager and obtains leadership in the market, accompanied by comparatively higher profits. Since each owner responds optimally to the choice of the competing firm's owner, any deviation to a different behavior, such as strict profit-maximization, would result the deviant firm to earn less profits than its previous case, since under this scenario the competitor will obtain competitive advantage in the market. Hence, there are no incentives for deviation from *Universal CSR*. Note also that the case where both owners do not hire SR managers is not an equilibrium, since the optimal response of an owner against a pure profit-maximizing owner is to hire a manager who is SR, in order to obtain competitive advantage in the market.<sup>20</sup>

### 3.3.2 The Asymmetric Case

Next, it is checked whether the asymmetric case in which e.g. firm  $i$ 's owner hires an SR manager, while firm  $j$ 's owner decides to act by himself, can be sustained as an equilibrium configuration. This is equivalent to choosing a manager of type  $\tau_j^{pm} = 0$  and also setting  $s_j^{pm} = 0$ .

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<sup>20</sup>The scenario where owners cheat on consumers can not be sustained as an equilibrium. The rationale goes as follows: it has already been assumed that the manager that each firm's owner hires, is the one whose attitude optimally fits to the owner's competitive goals. In this environment, an owner can hire a manager of a certain  $\tau_i$  but announce a higher  $\tau_i$ , if the hired manager costs him less money. Consumers would buy the product as if it was of higher SR, implying that they have been cheated by the owner. However, since each manager is committed to behaving in a certain manner by virtue of his personality type ( $\tau_i$ ), consumers, by observing quantities, will deduce that a manager is of a  $\tau_i$ , different from the announced one.

Considering the present candidate equilibrium, in the last stage of the game, consumers form beliefs on  $s_i$  and  $s_j$  based upon  $\tau_i$  and  $\tau_j$  set in stage one.

In the second stage of the game, manager  $i$  (owner  $j$ ) chooses  $s_i$  ( $s_j = 0$ ) and  $q_i$  ( $q_j$ ) in order to maximize his objective function given by eq.(3.7)(eq.(3.6)). The corresponding reaction curves for manager  $i$  and  $j$  regarding the market competition are given by:

$$q_i^{csr}(q_j^{pm}) = \frac{a - c - \gamma q_j^{pm}}{2} + \frac{2\bar{\theta}s_i^{csr} - cs_i^{csr^2}(2 - \tau_i^{csr})}{4} \quad (3.17)$$

$$q_j^{pm}(q_i^{csr}) = \frac{a - c - \gamma q_i^{csr}}{2} \quad (3.18)$$

Solving the system of foc equilibrium CSR effort and output in the second stage are given by:

$$s_i^{csr} = \frac{\bar{\theta}}{c(2 - \tau_i)}, \quad s_j^{pm} = 0 \quad (3.19)$$

$$q_i^{csr}(\tau_i^{csr}, s_i^{csr}) = \frac{a - c}{2 + \gamma} + \frac{\bar{\theta}s_i^{csr}(\tau_i^{csr})}{4 - \gamma^2}, \quad q_j^{pm}(\tau_i^{csr}, s_i^{csr}) = \frac{a - c}{2 + \gamma} - \frac{\gamma\bar{\theta}s_i^{csr}(\tau_i^{csr})}{2(4 - \gamma^2)} \quad (3.20)$$

Note that firm  $i$ 's output is positively connected with  $s_i^{csr}$ . The higher the firm  $i$ 's CSR effort is, the higher will be the firm  $i$ 's output. Conversely, firm  $j$ 's output decreases with  $s_i^{csr}$ . This is in line with the arguments presented in Proposition 1, that is the optimal response of an owner against a pure profit-maximizing owner is to hire a manager who is SR, because the latter is more aggressive during the output competition stage of the game. This way he can obtain a competitive advantage .

In the first stage of the game, given the decision of owner  $j$  to stick to profit-maximization, owner  $i$  chooses to hire a manager of type  $\tau_i^{csr}$  so as to maximize profits given by:

$$\Pi_i^{csr} = [q_i^{csr}(s_i^{csr}(\tau_i), 0)]^2 - \tau_i \frac{[s_i^{csr}(\tau_i)]^2}{2} q_i^{csr}(s_i^{csr}(\tau_i), 0) \quad (3.21)$$

Solving the foc one obtains a unique solution for the type of the manager that owner  $i$  will hire in equilibrium:

$$\tau_i^{csr*} = \frac{8c(a-c)(2-\gamma) + \bar{\theta}^2(6-\gamma^2) - \Xi}{c(a-c)(2-\gamma)(8-\gamma^2)} > 0 \quad (3.22)$$

Where:

$$\Xi = \sqrt{[2c(a-c)(2-\gamma)^2(2+\gamma)][2c(a-c)(2-\gamma)^2(2+\gamma) + \bar{\theta}^2(12-\gamma^2)] + \bar{\theta}^4(6-\gamma)^2}$$

Plugging  $\tau_i^{csr*}$  in eq.(3.21), (3.20), (3.19) and (3.6) one obtains firms' equilibrium CSR effort, output, prices and profits denoted by:  $s_i^{csr*}$ ,  $q_i^{csr*}$ ,  $q_j^{pm*}$ ,  $p_i^{csr*}$ ,  $p_j^{pm*}$ ,  $\Pi_i^{csr*}$  and  $\Pi_j^{pm*}$ , respectively.

By comparing the equilibrium output and profits under the Asymmetric case with the corresponding under the benchmark case without CSR activities, it is found that  $q_i^{csr*} > q_j^{pm*}$ ,  $q_i^{csr*} > q_i^{C*}$  and  $\Pi_i^{csr*} > \Pi_j^{pm*}$ ,  $\Pi_i^{csr*} > \pi^C$  always hold. Thus, the following lemma can be stated:

**Lemma 2:** *In the Asymmetric case, the firm that engages in CSR activities produces higher output and earns higher profits compared to its profit-maximizing competitor and the Benchmark case without CSR activities.*

The intuition behind these results is that an SR manager will produce output at a level higher than that produced under strict profit-maximization. Thus, in the Asymmetric case, the owner that delegates market competition decisions to an SR manager, obtains competitive advantage in the market. In addition to that, positive CSR effort will increase the demand and the price for his firm's product. These two effects increase profits, compared to the rival firm and the benchmark case. Conversely, the strictly profit-maximizing manager produces output at a level lower than that produced by the SR manager, and the absence of CSR effort decrease the demand and the price for his firm's product, which affects negatively the former's firm profitability.

In order to examine if the Asymmetric configuration is an equilibrium one, one has to check two possible deviations. Firstly, owner 2 may deviate from strict profit-maximization towards selecting an SR manager. Secondly, owner 1 may deviate and hire a profit-maximizing manager. If one owner is found to have incentives to deviate from his candidate equilibrium strategy, then the Asymmetric configuration is not a subgame perfect equilibrium. Therefore, it is not necessary to check for any other possible deviations.

In the first stage of the deviation game, owner 1 hires an SR manager ( $\tau_1^{csr*} > 0$ ), believing



that owner 2 will stick to profit-maximization. Owner 2 decides to deviate and also hire an SR manager of type  $\tau_2^d(\tau_1^{csr*}) > 0$ . Thus, plugging  $\tau_1^{csr*}$  in eq.(3.12) the following expression results:

$$\Pi_2^d(\tau_1^{csr*}, \tau_2) \tag{3.23}$$

Maximizing with respect to  $\tau_2$ , solving and rearranging, one obtains the deviant's optimal type of manager,  $\tau_2^d > 0$ . Substituting  $\tau_2^d$  in eq.(3.23) the deviant owner's profits are given by:  $\Pi_2^d$ .

By comparing the deviation profits  $\Pi_2^d$  with the profits that result in the candidate equilibrium (Asymmetric case), it is found that  $\Pi_j^{pm*} < \Pi_2^d$  always holds. Therefore, firm 2's owner has always incentives to deviate from a strict profit-maximizing behavior towards hiring an SR manager. The following proposition summarizes:

**Proposition 2:** *The asymmetric case in which one owner hires an SR manager while the other owner acts by himself can never arise in equilibrium.*

The intuition behind this result is along the lines of the equilibrium analysis given in Proposition 1 and Lemma 2 thus, it is omitted, since it reproduces the arguments stated there.

### 3.3.3 The No CSR case

In this subsection, it is investigated whether a situation in which no owner hires a manager can be sustained in equilibrium. Considering the results in section 2.1, it is investigated whether there are any circumstances, under which the benchmark case of No CSR activities can emerge as an equilibrium of the present game.

The following Proposition summarizes:

**Proposition 3:** *Universal non-CSR activities is never an equilibrium configuration.*

The intuition goes as follows. Following the arguments stated in Proposition 1 and Lemma 2 it becomes apparent that given No CSR as a candidate equilibrium configuration, then each firm's owner has incentives to deviate and hire an SR manager, hence engage in CSR in order to obtain leadership in the market, hence comparatively higher profits comparing to his previous status. For instance, let firm 1's owner stick to the (candidate) equilibrium behavior, i.e. he

does not hire a manager. Does firm 2's owner has an incentive to deviate by delegating output and CSR effort decisions to an SR manager of type  $\tau_2^d = \tau_i^{csr*}$ ? In this case he will optimally choose to set  $s_2^d = s_i^{csr} = \frac{\bar{\theta}}{c(2-\tau_i)}$  in the following CSR effort selection stage of the game. It is then easy to check that by plugging  $\tau_2^d, s_2^d$  in (3.12) one can obtain the deviant firm 2's profits,  $\Pi_2^d = \Pi_i^{csr*}$ . From Lemma 2  $\Pi_2^d > \pi^C$  holds, hence, there always are incentives for deviation and No CSR is never an equilibrium configuration.

### 3.4 Welfare analysis

In this part of the chapter, the social effects of hiring SR managers are investigated. Total welfare is defined as:

$$TW^A = CS_{net}^A + \Pi^A, \quad A = SR^*, C^* \quad (3.24)$$

with  $\Pi^A$  and  $CS_{net}^A$  being the overall market profits and net consumers' surplus respectively.

More specifically, the net consumer surplus of a  $\theta$ -type consumer is given by the following expression:

$$CS(\theta) = (a + \theta s_i)x_i(\theta) + (a + \theta s_j)x_j(\theta) - [x_i^2(\theta) + x_j^2(\theta) + 2\gamma x_i(\theta)x_j(\theta)]/2 - p_i x_i(\theta) - p_j x_j(\theta) \quad (3.25)$$

In equilibrium, due to symmetry  $s_i^* = s_j^* = s^{SR*}$  and  $p_i^* = p_j^* = p^{SR*}$  holds. Hence, after some manipulations, eq.(3.25) and (3.3) become:

$$CS(\theta) = (1 + \gamma)[x^*(\theta)]^2 \quad (3.26)$$

$$x^*(\theta) = \frac{a + \theta s^{SR*} - p^{SR*}}{1 + \gamma} \quad (3.27)$$

In order to obtain analytical solutions for the net consumers' surplus and the total welfare, in this section it is assumed that  $\theta$  is uniformly distributed, i.e.  $f(\theta) = 1, \theta \in [0, 1]$ .<sup>21</sup> Hence,

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<sup>21</sup>However different distributions of  $\theta$  may alter the results presented in this section. More specifically, if

considering eq.(3.26), the total net consumers' surplus is given by:

$$CS_{net}^{SR^*} = (1 + \gamma) \int_0^1 [x^*(\theta)]^2 d\theta \quad (3.28)$$

Substituting eq.(3.27) into (3.28) and solving gives:

$$CS_{net}^{SR^*} = \frac{3(a - p^{SR^*})^2 + 3s^{SR^*}(a - p^{SR^*}) + s^{SR^*2}}{3(1 + \gamma)} \quad (3.29)$$

Plugging eq.(3.29), (3.14), (3.16) and  $\Pi^{SR^*}$  into (3.24) one obtains total welfare for the Universal CSR,  $TW^{SR^*}$ . By comparing total welfare under Universal CSR to the one obtained under the benchmark case,  $TW^{C^*}$ , one finds that  $TW^{SR^*} > TW^{C^*}$  always. The following Proposition summarizes:

**Proposition 4:** *Firms owners' strategic choice to engage in CSR activities increases welfare always.*

The reasoning behind this result is that according to Propositions 1 and 2, it has already been clear that in equilibrium, each firm's owner has a dominant strategy to hire an SR manager. This tends to increase output, profits, consumers' surplus and total welfare. On the other hand, hiring SR managers increases unit cost of production, which decreases total welfare. It is found that the positive effect of increased consumers' surplus on total welfare dominates the negative effect of increased costs and thus,  $TW^{SR^*} > TW^{C^*}$  always.

### 3.5 An extension: Fixed costs of CSR

Anecdotal evidence regarding some corporations' CSR practices reveal that in some cases engaging in CSR, besides variable costs, may also effect the fixed costs of the firm. Such examples could be the installation of a filter in a polluting facility in order to abate externalities caused by its operation, or the deployment of a production process that decreases labor accidents so as to ensure working safety for employees.

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$\bar{\theta} \rightarrow 0$ , then CSR activities by both firms may decrease total welfare. Conversely, if  $\bar{\theta} \rightarrow 1$ , the result that CSR activities increase welfare, is reinforced. Garcia-Gallego and Georgantzis (2008) explore how changes of  $\theta$  may affect the provision of CSR.

Therefore it is necessary to explore how the results may change under the assumption of CSR effecting the fixed costs of the firm. Firm  $i$ 's profit function is now given by  $\Pi_i = (a + \bar{\theta}s_i^e - q_i - \gamma q_j)q_i - c(1 + s_i^2)q_i - F$ . Where  $F$  stands for the fixed costs due to CSR activities. If  $F$  is not significantly high then nothing will change regarding the results. However in the case which  $F$  is relatively high the results will be sensitive to the extent fixed costs may effect the profitability of the firms that engage in CSR. More specifically if  $\Pi^{SR} - F > \pi^C$  or  $\Pi_i^{csr} - F > \pi^C$ , then the case where no owner engages in CSR may appear in equilibrium.

### 3.6 Concluding remarks

This chapter explores firms owners' incentives to engage in Corporate Social Responsibility activities in the context of an oligopoly, introducing strategic managerial delegation and vertical product differentiation. Owners are given the opportunity to hire a "socially responsible" manager and delegate to him market competition decisions. Delegation of authority from owners to "SR" managers is a credible signal to consumers about the CSR activity policy that the firm is intended to follow. Hence it will increase consumers' valuation for their firm's product. Each SR manager will try to maximize his utility given by the sum of firm's profits plus the additional utility of SR managers that engage in CSR activities.

It is found that in equilibrium both owners' strategy will be to employ an SR manager to compete in the market, because by doing so each owner has the opportunity to obtain competitive advantage against the rival firm. This interaction among competing firms causes equilibrium output and profits to be higher compared with the benchmark case where no CSR activities are undertaken. The present analysis also reveals that CSR activities increase social welfare.

The analysis was carried out for a duopolistic market structure. To my opinion, the duopolistic market provides all essential insights about the firms' owners' incentives to undertake CSR activities. I am also aware of the limitations of the present analysis in assuming specific functional forms. However, it is the nature of the equilibrium conditions that drive the present results that allows the resercher to argue that these results will also hold under general demand and cost functions. The use of more general forms would jeopardize the clarity of the

present findings, without significantly changing their qualitative character. Given the current debate about the market and welfare implications of Corporate Social Responsibility the present chapter sheds light on the firms' incentives to engage in CSR activities in oligopolistic markets.

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## Chapter 4

# Private CSR Activities in Oligopolistic Markets: Is there any room for Regulation?

### 4.1 Introduction

The large publicity on Corporate Social Responsibility (CSR hereafter) over the last few years has led many companies to account for the social consequences of their activities. As a result CSR has emerged as a prime issue among firms, exploiting ways to benefit society, and at the same time, benefit from this new challenge.<sup>1</sup> Following the terminology of Porter & Kramer (2006), potential firms' benefits from engaging in CSR actions may be moral obligation, sustainability, "license to operate" and reputation.<sup>2</sup> For these benefits to be effective, firms have to convince potential consumers about their social orientation.

However, CSR effort by firms may include cost increasing actions within their value chain, which are difficult, if not impossible to be observed by a large scope of consumers, even after consumption. For instance the firm may operate with respect to the interests of its stakeholders

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<sup>1</sup>More than half of the top 100 corporations in the 16 more industrialized countries published a CSR report in the year 2005 (Becchetti et al., 2006).

<sup>2</sup>For instance, Baron (2001, 2003), Bagnoli and Watts (2003), Manasakis et. al (2006) and Garcia-Gallego and Georgantzis (2008), under the scope of strategic CSR, formalize situations where firms create a socially friendly image in order to obtain competitive advantage in the market in which they operate.

such as its employees (investing in workplace safety), suppliers (by supporting local suppliers rather than cheaper alternative sources in order to support local economy), and the environment (by reducing emissions of pollutants).<sup>3</sup> Therefore, the SR attribute of a product can be characterized as a credence good. Hence, in the absence of a credible information disclosure system, firms may fail to persuade socially conscious consumers about their true commitment to social values, hence they will have no incentives to undertake any costly CSR activity.

Given this evidence, the question that arises is the following: “*Which are the policy instruments that a regulator can employ in order to promote firms’ engagement in CSR activities, and what are their effects on market outcomes and social welfare?*”. The present chapter addresses and formalizes this question in an oligopolistic market for a final good, where consumers differ with respect to their valuation towards CSR activities.

The basic idea behind the present model is that firms strategically engage in CSR activities in order to create a “*socially friendly image*” for their product. It is considered that consumers are homogeneous regarding the physical characteristics of the goods, but heterogeneous towards the valuation of the CSR aspects of each product. More socially conscious consumers have higher valuation for the product of the firm that engages in CSR activities, hence, they are willing to pay a higher price for the “socially friendly” good.<sup>4</sup>

Since CSR is defined as: “*firms’ commitment to social and ecological considerations, beyond the law requirements*” there cannot be any “*command and control*” measures, such as compulsory CSR standards in order to impose socially conscious behavior by firms. Thus, certification is considered as a policy instrument, i.e. a certifier sets certain social and environmental criteria that should be respected during the firm’s operational activities and then provides certification to any firm that fulfills those criteria.<sup>5</sup> Following Bottega & De Freitas (2006) it is assumed

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<sup>3</sup>See for example Mayer (1999) and Bris & Brisley (2006).

<sup>4</sup>Becchetti et al. (2005) quote the “2003 Corporate Social Responsibility Survey”. The main finding of this survey is that the amount of consumers that are socially concerned on their purchasing choices was 62% in 2001 in Europe.

<sup>5</sup>For example, the certification SA8000 (2006) is specialized in the workers’ human rights in developing countries and it is developed and overseen by Social Accountability International (SAI) (<http://www.sa-intl.org/>. Date last visited: January 24, 2008). Additionally, ISO 26000 which certifies SR activities by firms started from 2008. (<http://isotc.iso.org/livelink/livelink/fetch/2000/2122/830949/3934883/3935096/home.html>. Date last visited: January 24, 2008).

Moreover, an example of a public certifier is The Government of Belgium which certifies the SR action of firms that wish to be certified. (See <http://www.label-social.be>, Date last visited January 24, 2008)

An example of for profit organizations that provide certification is Ecocert (see <http://www.ecocert.com>. Date

that certification is an effective system of information disclosure, that permits consumers to distinguish the social characteristics of the products they purchase.<sup>6</sup>

Two possible scenarios are investigated. The first is the "Certification by a private organization" one, assuming that a voluntary certificate provided by a private, profit maximizing organization is an appropriate system of information disclosure that permits consumers to distinguish the social characteristics of the products they purchase, without the need for a policy intervention. It is found that in this case both firms' endogenous choice will be to engage in CSR, seeking for a competitive advantage in the market competition stage, via an increase of consumers' willingness to pay for their final product. The above interaction among competing firms, increases consumers' surplus and total welfare comparing to the benchmark case without CSR activities.

The second scenario refers to the case in which the regulator intervenes, in order to solve the ensuing "market of lemons" problem, by proposing a certain standard of CSR effort to the firms, and provides a certification to the firms that comply with the standard voluntary. Similar to the previous scenario, this certification endows consumers with credible information about the CSR aspects of each firm's product, otherwise unobservable. The main finding is that the regulator will set a standard of positive CSR effort up to a level in which both firms will have incentives to comply. This standard will be higher than the one set by the private certifier. Hence in equilibrium, consumers' surplus and total welfare increase comparing to the benchmark case without CSR activities and the certification by a private organization configuration.

Unlike the present chapter, the vast majority of the literature on quality certification is based on the seminal paper by Gabszewich and Thisse (1979) and concentrates on oligopolistic models in which firms' products differ only in their vertical quality characteristics, which are observable by consumers.<sup>7</sup> Moreover in the aforementioned literature the cost to increase quality is assumed to be zero, or fixed. The envisaged duopolistic market follows Häckner (2000) along

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last visited January 24, 2008). Another example is the Scientific Certification Systems (SCS), which certifies environmental consciousness in product manufacturing and natural resource extraction.

<sup>6</sup>This assumption is in line with recent empirical evidence, according which, EU citizens better trust a certification labeled on the product, comparing to other forms of information about the social characteristics of the products they purchase (see Fliess et al., 2007). Here we assume that the certifier spends an amount from the certification fees that collects on informative advertising, in order to inform consumers about the CSR characteristics of the certification that provides.

<sup>7</sup>See for instance Daughety and Reinganum, (2005), Garella and Fluet, (2002).

with Garella and Petrakis (2008), using a utility function that combines horizontal and vertical differentiation aspects of firms' products. The vertical differentiation represents the CSR aspects of the production process that are perceived as quality improvement of the final product by socially conscious consumers. The present chapter contributes on this branch of the literature assuming that, since CSR is considered as a credence good, there is no ex ante mechanism that can credibly inform consumers about the CSR characteristics of each product. Hence, in the absence of a credible information disclosure mechanism about SR characteristics of the firms' products to consumers, firms will fail to persuade consumers about their true commitment to social values, thus, a "market of lemons" problem arises.<sup>8</sup> Additionally it is assumed that engaging in CSR increases variable costs, also.

Furthermore, this chapter builds on a recent branch of the certification literature, that examines the effects of alternative certification regimes, considering that the true quality of the final products is difficult to be observed by consumers. Bottega and De Freitas (2006) examine the welfare implications of the coexistence of public and private environmental quality certification schemes, in a monopolistic context. The present work is closer to the work of Bonroy and Constantatos (2008), assuming an oligopolistic market for final products, in which the strategic interactions between the competing firms are investigated. They examine the certification of credence goods' quality, in a Bertrand competition context, focusing on the difference between mandatory and voluntary certification. Conversely, in the present work firms' incentives to engage in CSR (hence provide a credence attribute of higher quality to their final product) are examined, focusing on different sources of certification (public or private), assuming that certification is always voluntary.

The present work, also contributes to the existing literature on "strategic CSR", a term that was introduced by Baron (2001) and refers to the case where firms are assumed to be socially responsible because they anticipate a benefit from such a behavior. Baron (2001, 2003) examines CSR under the prism of the strategic choice between public and private politics. His main finding is that private politics and CSR affect the strategic position of a firm in an industry

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<sup>8</sup>More specifically, once consumers have been convinced that one firm has undertaken positive CSR effort, they increase their willingness to pay for the firm's good. The firm has no incentives to spend on CSR activities as these are costly for the firm. Consumers realize the firm's incentives and thus rationally believe that there will be zero CSR activity. The firm, in turn, spends zero on CSR activities in equilibrium.

under the existence of activist consumers, who can boycott firms with non-socially friendly behavior. In the same vein, Calveras et al. (2006), assuming a perfectly competitive supply of inputs, compare the effects of formal regulation to firms' incentives to provide socially friendly goods as a response to increased activism on behalf of consumers. They argue that substituting formal regulation with firms CSR actions may cause inefficiency, in which non activist consumers free-ride the willingness to pay of activist consumers, lowering formal regulation. However the above literature focuses on the difference between the provision of CSR by private firms and the regulator. The main difference of the present work with the above literature is that the present chapter examines the conditions under which the regulator can complement the provision of CSR by private firms, via the provision of certification to the firms that engage in CSR.

The rest of this chapter is organized as follows: Section 2 presents the model. In Section 3, the different scenarios are solved and a detailed equilibrium analysis is conducted. Section 4 offers some concluding remarks.

## 4.2 The Model

Regarding the market examined here, in the production side there are two firms, denoted by  $i, j = 1, 2, i \neq j$ . Each firm produces one brand of a differentiated good. On the demand side, there is a *unit mass* of consumers composed by individuals who have homogeneous preferences regarding the physical characteristics of the goods. They are, however, heterogeneous regarding their valuation of the CSR activities that are undertaken by the firm that produces the good. In particular, following Häckner (2000), the utility function of the  $\theta$ -type consumer is given by:

$$U = (a + \theta s_i)x_i(\theta) + (a + \theta s_j)x_j(\theta) - [x_i^2(\theta) + x_j^2(\theta) + 2\gamma x_i(\theta)x_j(\theta)]/2 + m(\theta) \quad (4.1)$$

where  $x_i(\theta)$ ,  $i = 1, 2$ , represents the quantity of good  $i$  bought by the consumer of type  $\theta$  and  $m(\theta)$  is the respective quantity of the "composite good". The parameter  $\gamma \in [0, 1]$  is a measure of the degree of substitutability among goods, with  $\gamma = 0$  corresponding to the case of independent goods and  $\gamma = 1$  to that of homogeneous goods. Further,  $s_i \geq 0$  represents the CSR effort that firm  $i$  undertakes which, in turn, increases  $\theta$ -type consumer's valuation for

its good by  $\theta s_i$ . In other words,  $\theta$  represents the increase of  $\theta$ -type consumer's willingness to pay for the firm  $i$ 's good per unit of CSR effort undertaken by firm  $i$ . Thus, the more socially conscious a consumer is, the higher is its  $\theta$ , while a consumer who does not value the firms' CSR activities at all is of type  $\theta = 0$ . It is assumed that  $\theta$  is distributed uniformly where  $\theta \in [0, 1]$ . Thus,  $\bar{\theta} = 1/2$  represents the average type of consumer in the population.

Maximization of utility (4.1) with respect to  $x_i(\theta)$  and  $x_j(\theta)$  gives the (inverse) demand functions for the  $\theta$ -type consumer:

$$p_i = a + \theta s_i - x_i(\theta) - \gamma x_j(\theta), \quad i = 1, 2 \quad (4.2)$$

where  $p_i$  and  $p_j$  are the firms' unit prices, while the price of the composite good has been normalized to unity. By inverting (4.2) one obtains the  $\theta$ -type consumer's demand for good  $i$ :

$$x_i(\theta) = \frac{a(1 - \gamma) + \theta(s_i - \gamma s_j) - p_i + \gamma p_j}{1 - \gamma^2} \quad (4.3)$$

By integrating (4.3) with respect to  $\theta$ , one gets firm  $i$ 's aggregate demand function:

$$q_i(p_i, p_j) = \int_0^1 x_i(\theta) d\theta = \frac{a(1 - \gamma) + \bar{\theta}(s_i - \gamma s_j) - p_i + \gamma p_j}{1 - \gamma^2} \quad (4.4)$$

Finally, by inverting (4.4), firm  $i$ 's (inverse) aggregate demand function is obtained:

$$p_i(q_i, q_j) = a + \bar{\theta} s_i - q_i - \gamma q_j, \quad i = 1, 2, i \neq j \quad (4.5)$$

Observe that the aggregate demand function corresponds to the demand function of an average type consumer,  $\bar{\theta}$ .

It is assumed that both firms are endowed with identical constant returns to scale production technologies. Firm  $i$ 's total cost function is given by  $C_i(q_i, s_i) = c(1 + s_i^2)q_i$ . This implies that, for a given CSR effort  $s_i$ , the firm  $i$ 's marginal (and average) production cost is constant and equal to  $c(1 + s_i^2)$ . Yet, a higher CSR effort increases, at an increasing rate, firm  $i$ 's unit production costs. This can be justified on the grounds that an individual firm's level of CSR activities, such as improving working conditions for employees, buying more expensive inputs from local

suppliers, financing recycling and other SR campaigns or introducing “green” technologies, has an increasingly negative impact on the firm’s unit production costs.

Firm  $i$ ’s profits can then be expressed as:

$$\Pi_i = (a + \bar{\theta}s_i - q_i - \gamma q_j)q_i - c(1 + s_i^2)q_i \quad (4.6)$$

Therefore, CSR activities by firm  $i$  lead to higher consumers’ valuation for its product and thus to higher aggregate demand for the firm, but, at the same time, they increase firm  $i$ ’s unit and total production costs. Note however that firms’ CSR efforts may not be observable by consumers even after consumption. Thus, the SR quality of a product can be categorized as a credence good. Hence, there is a “lemons’ problem” in the present setup. Once consumers have been convinced that firm  $i$  has undertaken a CSR effort  $s_i$ , and have thus increased their willingness to pay for the firm’s good, the firm has no incentives to spend on CSR activities as these are costly for the firm. Consumers realize the firm’s incentives and thus rationally believe that there will be zero CSR activity. The firm, in turn, spends zero on CSR activities in equilibrium.

To solve for the ensuing lemons problem, the literature on certification is considered. More specifically, two alternative scenarios are considered: The first refers to the case in which a profit-maximizing organization provides firms with a credible certificate about their SR activities and the second considers the case in which the regulator intervenes, by providing the certification himself with respect to total welfare.

### 4.3 Equilibrium Analysis.

#### 4.3.1 The Benchmark case without CSR activities.

Before proceeding to the certification scenarios, the benchmark case where no owner engages in CSR is discussed.<sup>9</sup> In this scenario the market outcomes coincide to the standard Cournot game with differentiated goods, where each owner chooses its output to maximize profits,  $\Pi_i =$

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<sup>9</sup>This configuration also reflects the case where a firm that engages in CSR, does not have any credible way to persuade consumers about its social orientation. In this case the results coincide to the ones obtained in this subsection.

$(a - q_i - \gamma q_j)q_i - cq_i$ . From the first order condition, the reaction function of owner  $i$  is,

$$q_i = R_i^C(q_j) = \frac{a - \gamma q_j - c}{2} \quad (4.7)$$

By symmetry, the equilibrium output, price and profits are, respectively,

$$q^C = \frac{a - c}{2 + \gamma}; \quad p^C = \frac{a + (1 + \gamma)c}{2 + \gamma}; \quad \pi^C = \frac{(a - c)^2}{(2 + \gamma)^2} \quad (4.8)$$

Finally, since all consumers have identical preferences over the physical characteristics of the two goods and there is a unit mass of them in the population, it turns out that each consumer buys a quantity  $x^C = q^C$  from each good. Using (4.1) and (4.8), it can be checked that consumers' surplus and total welfare are given by  $CS^C = (q^C)^2(1 + \gamma)$  and  $TW^C = (q^C)^2(3 + \gamma)$  respectively.

### 4.3.2 Certification by a private organization.

In this section, it is assumed that the only credible information disclosure system from firms to consumers regarding the CSR attribute of the products, can only be provided through a certification by a private, profit maximizing organization.<sup>10</sup> Following Bottega and De Freitas (2006) along with Hardling and Alexander (2003), it is assumed that the private certifier has all the bargaining power, hence, he is in position to extract all the extra firms profits from CSR activities. Each firm's owner can set the CSR effort proposed by the private certifier or not engage in CSR activities at all. Each owner may make lower CSR effort than the proposed standard and pretend not to so. Therefore the private certifier has to monitor and certify CSR effort made by firms, assuming that, the probability the certifier tracing an owner that reveals untruthful information is almost unity. The cost of monitoring is paid by each firm that wishes to be certified. More specifically, each firm will be willing to get the certification by the private certifier, and engage in CSR only if the profits of engaging in CSR are higher or equal than if firm acts in the opposite manner. Hence, the profits of the private certifier will be equal to a

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<sup>10</sup>Following the terminology of Bonroy and Constantatos (2008), it is assumed that this certification is perfect. Hence, if consumers see the CSR certification of a product, they are aware that the firm that produces it is socially responsible.



fee given by:

$$F = \Pi_{gross}^{pc} - \pi^C \quad (4.9)$$

where  $\Pi_{gross}^{pc}$  stands for the gross firm's profits from engaging in CSR, before the payment of the fee, and  $\pi^C$  are firm's profits in the case no firm engages in CSR. The fee cannot be higher than  $\Pi_{gross}^{pc} - \pi^C$ , because then the firm will not have incentives to engage in CSR and hence seek for certification. Thus, the certifier's objective of the private certifier coincides to the firms extra profits from CSR effort.<sup>11</sup>

A three stage game is considered. In the first stage the private certifier sets the CSR effort standard and the fee for certification in order to maximize his profits. In the second stage, both firms' owners decide whether or not they will engage in CSR. If yes, they have to comply with the standard and pay the fee in order to be certified. In the last stage firms compete in the market a lá Cournot. The game is solved backwards.

Hence, in the last stage of the game, owner  $i$  sets  $q_i$  to maximize his firm's profits (4.6), taking as given the output  $q_j$  of his rival, along with the CSR efforts,  $(s_i, s_j)$ , chosen in the previous stages.

The first order condition (foc) of (4.6) leads to firm  $i$ 's reaction function:

$$q_i = R_i^{pc}(q_j) = \frac{a - c - \gamma q_j}{2} + \frac{\bar{\theta} s_i - c s_i^2}{2} \quad (4.10)$$

Comparing  $R_i^{pc}(q_j)$  to the benchmark case with no CSR activities  $R_i^C(q_j)$ , in which only the first term of the RHS of (4.10) appears, one observes that CSR effort has two opposing effects on owner  $i$ 's output decision. On the one hand, CSR effort  $s_i$  augments the demand for the firm  $i$ 's good and thus tends to increase equilibrium output. However, it increases firm  $i$ 's unit costs also, tending to decrease equilibrium output. Now if  $0 < s_i < \bar{\theta}/c$  the first effect is dominant and the CSR effort undertaken by firm  $i$  shifts its reaction function outwards.<sup>12</sup> If  $s_i > \bar{\theta}/c$ , the opposite holds.

Solving the system of focs (4.10), one obtains the equilibrium output:

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<sup>11</sup>It is assumed that the private certifier spends a part of  $F$  on monitoring and informative advertising in order to provide information about the SR characteristics of the product to consumers.

<sup>12</sup>This is in fact the case in equilibrium - see below.

$$q_i^{pc}(s_i, s_j) = \frac{a(2 - \gamma) + \bar{\theta}(2s_i - \gamma s_j) - c[2(1 + s_i^2) - \gamma(1 + s_j^2)]}{(4 - \gamma^2)} \quad (4.11)$$

Observe that firm  $i$ 's equilibrium output increases with  $s_i$ , while it decreases with  $s_j$ .<sup>13</sup> The higher the firm  $i$ 's CSR effort  $s_i$  is, the higher will be the firm  $i$ 's output. This is so because the owner then earns higher profits per unit of output produced by firm  $i$ . On the other hand, when the rival owner sets a higher output for firm  $j$ , firm  $i$ 's owner optimally reacts by reducing its output (due to the strategic substitutability of decision variables). A similar reasoning applies when firm  $j$ 's CSR effort becomes higher, in which case its owner has incentives to increase firm  $j$ 's output because he earns higher profits per unit of output produced.

In the second stage both firms decide if they engage in CSR or not, given the level of CSR set by the certifier. By assumption firms will engage in CSR only if the net profits are equal or higher to the ones obtained under the benchmark regime without CSR activities. That is only if:  $\Pi_{net}^{pc} \geq \pi^C$ .

In the first stage, the private certifier chooses CSR effort  $s_i$  to maximize firm  $i$ 's gross profits, which from the focs of (4.6) is given by,  $PR_i^{pc}(s_i, s_j) = [q_i^{pc}(s_i, s_j)]^2$ . The foc of the latter is equivalent to  $\partial q_i^{pc}(\cdot)/\partial s_i = 0$ . Due to symmetry the equilibrium CSR effort is given by:

$$s^{pc} = s_i^{pc} = s_j^{pc} = \frac{\bar{\theta}}{2c} > 0 \quad (4.12)$$

Plugging  $s^{pc}$  into(4.11), (4.4) and (4.6), for  $\bar{\theta} = 1/2$ , one obtains the equilibrium values for output, price and gross profits, respectively,

$$q^{pc} = \frac{1 + 16c(a - c)}{16c(2 + \gamma)} \quad (4.13)$$

$$p^{pc} = \frac{a + (1 + \gamma)c}{2 + \gamma} + \frac{(3 + \gamma)}{16c(2 + \gamma)}$$

$$\Pi_{gross}^{pc} = \left( \frac{1 + 16(a - c)c}{16c(2 + \gamma)} \right)^2 \quad (4.14)$$

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<sup>13</sup> Provided that  $s_i, s_j < \frac{\bar{\theta}}{c}$  - see our discussion above.

Hence, with respect to (4.9) the net profits for the private certifier and firm  $i$  are given by

$$\Pi_{gross}^{pc} - \pi^C = F = \frac{1 + 32(a - c)c}{128c^2(2 + \gamma)^2}, \text{ and } \Pi_{net}^{pc} = \pi^C = \frac{(a - c)^2}{(2 + \gamma)^2} \quad (4.15)$$

Clearly, from (4.12) the CSR effort increases with the social consciousness of the average consumer type  $\bar{\theta}$ , while it decreases with the degree of inefficiency of the CSR “production technology” (as captured by a higher  $c$ ). Finally, in equilibrium, both firms’ owners’ endogenous choice is to engage in CSR activities when the private certifier sets positive CSR effort  $s^{pc} = \frac{\bar{\theta}}{2c} > 0$ . The intuition behind this is that private certifier optimally sets a positive level of CSR effort  $s^{pc}$  up to the point that the certified firm will maximize its gross profits, and thus the fees that he collects. Since each firm obtains profits equal to its previous status  $\Pi_{net}^{pc} = \pi^C$ , for  $s^{pc}$  then both firms endogenous choice is to engage in CSR. Furthermore if one firm does not engage in CSR then the rival firm obtains competitive advantage in the market and it ends up with lower profit levels than its previous status. The following Proposition summarizes:

**Proposition 1:** *In the Certification by a private organization scenario, assuming that firms’ certification by a private organization is a credible system of information provision to consumers about the CSR characteristics of the products they purchase, there exists a level of positive CSR effort such that both firms’ owners endogenous choice is to engage in CSR activities.*

Next, the societal effects of the certification by a private organization, are considered.

Total welfare is defined as:

$$TW = CS_{net}^{pc} + 2\Pi_{net}^{pc} + F \quad (4.16)$$

with  $2\Pi_{net}^{pc} + F$  and  $CS_{net}^{pc}$  being the overall market profits and net consumers’ surplus respectively.

More specifically, the net consumer surplus of a  $\theta$ -type consumer is given by the following expression:

$$CS(\theta) = (a + \theta s_i)x_i(\theta) + (a + \theta s_j)x_j(\theta) - [x_i^2(\theta) + x_j^2(\theta) + 2\gamma x_i(\theta)x_j(\theta)]/2 - p_i x_i(\theta) - p_j x_j(\theta) \quad (4.17)$$

In equilibrium, due to symmetry  $s_i^* = s_j^* = s^{pc}$  and  $p_i^* = p_j^* = p^{pc}$  holds. Hence, after some manipulations, eq.(4.17) and (4.3) become:

$$CS(\theta) = (1 + \gamma)[x^*(\theta)]^2 \quad (4.18)$$

$$x^*(\theta) = \frac{a + \theta s^{pc} - p^{pc}}{1 + \gamma} \quad (4.19)$$

Hence, from eq.(4.18), the total net consumers' surplus is given by:

$$CS_{net}^{SR} = (1 + \gamma) \int_0^1 [x^*(\theta)]^2 d\theta \quad (4.20)$$

Substituting eq.(4.19) into (4.20) and solving gives:

$$CS_{net}^{pc} = \frac{3(a - p^{pc})^2 + 3s^{pc}(a - p^{pc}) + s^{pc^2}}{3(1 + \gamma)} \quad (4.21)$$

Hence, with respect to eq.(4.16) and (4.17) the total welfare is now given by:

$$TW^{pc} = \frac{3(a - p^{pc})^2 + 3s^{pc}(a - p^{pc}) + s^{pc^2}}{3(1 + \gamma)} + 2\left(\frac{a - c}{2 + \gamma}\right)^2 + \frac{1 + 32(a - c)c}{128c^2(2 + \gamma)^2} \quad (4.22)$$

By comparing the equilibrium values of output, profits, consumers' surplus, and total welfare obtained in the certification by a private organization scenario to the corresponding values in the benchmark case, it is found that  $q^{pc} > q^C$ ,  $\Pi_{gross}^{pc} > \Pi_{net}^{pc} = \pi^C$ ,  $CS_{net}^{pc} > CS^C$  and  $TW^{SR} > TW^C$  always. Hence, the following Proposition holds:<sup>14</sup>

**Proposition 2:** *In the certification by a private organization scenario, equilibrium output, gross profits, consumers' surplus and total welfare are always higher comparing to the benchmark case without CSR activities.*

**For proof see Appendix**

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<sup>14</sup>However, the above results hold only under the assumption that certification by a private organization is a credible mechanism of information provision to consumers about the CSR characteristics of the products they purchase. If one loosens this assumption, firms will fail to persuade consumers about their true commitment to social values, thus, a "market of lemons" problem arises. In this case no firm will have incentives to undertake CSR effort in equilibrium, and the equilibrium outcomes coincide to the ones observed in the benchmark case without CSR activities.

It is easy to understand the reason behind output levels by considering the arguments for both firms' reaction functions after (4.10). Since  $s^{pc} < \bar{\theta}/c$ , then output will be higher in the certification by a private organization scenario. Next, firms' profits are considered. It is obtained that  $\Pi_{net}^{pc} = \pi^C$ , since the private certifiers extracts all extra profits by assumption. If one focuses on consumers' surplus he finds that it is increasing in CSR effort. Hence, since  $s^{pc}$  then consumers' surplus in the certification by the regulator scenario is equal or higher comparing to the alternative ones. Regarding total welfare, according to proposition 1, it has already been clear that in equilibrium, each firm's owner will engage in CSR. This interaction among competing firms has a positive effect on total welfare, since it increases output and consumers' surplus as well. On the other hand, engaging in CSR increases variable cost of production, which decreases total welfare. It is found that the positive effect of increased profits and consumers' surplus on total welfare dominates the negative effect of increased costs and thus,  $TW^{SR} > TW^C$  always.<sup>15</sup>

### 4.3.3 Certification by the regulator.

In this subsection, assuming that there is no other appropriate system of information disclosure that endows consumers with the necessary information about the CSR characteristics of the products they purchase, it is considered that the regulator proposes a certain standard of CSR effort to the firms, denoted by  $s^R$ , and provides a certification to the firms that comply with the standard.<sup>16</sup> It is assumed that this kind of certification is credible to consumers. Similar to the previous subsection, each firm's owner can set the CSR effort proposed by the regulator or not engage in CSR activities at all. The regulator has to monitor and certify CSR effort made by firms, assuming that, the probability the regulator tracing an owner that reveals untruthful information is almost unity. The fixed cost of monitoring is denoted by  $M$  and it is paid by

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<sup>15</sup> Anecdotal evidence regarding some corporations' CSR practices reveal that in some cases engaging in CSR, besides variable costs, may also effect the fixed costs of the firm. Such examples could be the installation of a filter in a polluting facility in order to abate externalities caused by its operation, or the deployment of a production process that decreases labor accidents so as to ensure working safety for employees. The results presented here, are sensitive to the assumption of CSR effecting the fixed costs of the firm. More specifically, if fixed costs are not significantly high, then nothing will change qualitatively regarding the results. In the opposite case the results will be sensitive to the extent fixed costs may effect the profitability of the firms that engage in CSR. Thus, the case where no owner engages in CSR may appear in equilibrium.

<sup>16</sup> Note that a similar modeling can also be considered for the case in which a non for profit organization such as a NGO provides the certification, instead of the regulator, with respect to social welfare.

each firm that wishes to be certified.<sup>17</sup> Thus, each firm's owner objective function is now given by the following expression:

$$\Pi_i^R = (a + \bar{\theta}s_i - q_i - \gamma q_j)q_i - c(1 + s_i^2)q_i - M \quad (4.23)$$

Where,  $M = 0$  in the case which a firm does not engage in CSR, hence, certification is inapplicable.

Here a three stage game is considered. In the first stage the regulator fixes a standard of CSR effort  $s^R$ , with respect to total welfare. In the second stage, given  $s^R$ , both firms' owners decide whether or not they will engage in CSR activities, while in the last stage owners compete in the market a lá Cournot. The game is solved using backwards induction.

Hence, in the last stage of the game, owner  $i$  sets  $q_i$  to maximize his firm's profits now given by eq.(4.23), taking as given the output  $q_j$  of his rival, along with the CSR effort  $s^R$ , chosen by the regulator in the first stage.

Solving the system of focs, and rearranging one obtains the equilibrium output of the third stage:

$$q_i(s^R) = \frac{a - c}{2 + \gamma} + \frac{s^R(\bar{\theta} - cs^R)}{2 + \gamma} \quad (4.24)$$

Plugging eq.(4.24) into (4.4) and (4.23) one obtains firms  $i$ 's price and profits respectively during stage 2, given by:

$$p_i(s^R) = \frac{a + c(1 + \gamma)}{2 + \gamma} + \frac{s^R[\bar{\theta} + cs^R(1 + \gamma)]}{2 + \gamma} \quad (4.25)$$

$$\Pi_i(s^R) = \left(\frac{a - c}{2 + \gamma}\right)^2 + \frac{s^R(\bar{\theta} - cs^R)}{(2 + \gamma)^2} [2(a - c) + s^R(\bar{\theta} - cs^R)] - M \quad (4.26)$$

In the second stage both firms decide whether they engage in CSR activities or not. Firms will undertake CSR effort only if their profitability is higher comparing to the benchmark case without CSR activities. Hence, by considering eq.(4.26) firms will engage in CSR only if:  $\frac{s^R(\bar{\theta} - cs^R)}{(2 + \gamma)^2} [2(a - c) + s^R(\bar{\theta} - cs^R)] > M$ , or  $s_{pc}^R \leq \frac{\bar{\theta} + \sqrt{4c(a - c) + \bar{\theta}^2 - 4c\sqrt{(a - c)^2 + M(2 + \gamma)^2}}}{2c}$ ,  $M \leq$

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<sup>17</sup>M can only be spent by the regulator in order to cover monitoring and informative advertizing expences.

$\frac{\bar{\theta}^2[8c(a-c)+\bar{\theta}^2]}{16c^2(2+\gamma)^2}$ , where  $s_{pc}^R$  represents firms' participation constraint CSR effort. Note that  $s_{pc}^R \leq \bar{\theta}/c$  for every  $\bar{\theta}, 0 \leq M \leq \frac{\bar{\theta}^2[8c(a-c)+\bar{\theta}^2]}{16c^2(2+\gamma)^2}$ . Thus, from the analysis of eq.(4.10), if the above condition holds, the increase in firms' profits due to higher demand and revenues from producing CSR related products overcomes the increase in firms' costs due to higher CSR effort, and monitoring expenditures, comparing to the benchmark case without CSR activities and therefore, both firms will have incentives to engage in CSR activities. Otherwise owners will have no incentives to comply with the CSR standard.<sup>18</sup>

In the first stage, the regulator sets CSR effort so as to maximize total welfare now given by:

$$TW^R = CS_{net}^R(s^R) + 2\Pi_i(s^R) + 2M \quad (4.27)$$

Where, with respect to eq.(4.21),  $CS_{net}^R = \frac{3(a-p^R)^2 + 3s^R(a-p^R) + s^R^2}{3(1+\gamma)}$  represents the net consumers' surplus in the certification the regulator scenario. By solving the foc and rearranging one obtains the socially optimal minimum CSR effort:  $s^{R*}$ .<sup>19</sup> Note that if  $s^{R*} \leq s_{pc}^R$  then the regulator will set  $s^{R*}$  and both firms will comply with the standard. However, if  $s^{R*} > s_{pc}^R$ , then  $s^{R*}$  does not give incentives to firms to be involved in CSR and the standard is useless. Since the regulator's objective is that both firms engage in CSR that will improve welfare he sets  $s^R$  such that:

$$s^R = \min[s^{R*}, s_{pc}^R] \quad (4.28)$$

By comparing the CSR effort level set in the certification by the regulator scenario ( $s^R$ ) to the one set in the Profit maximizing organization certification scenario ( $s^{pc}$ ) it is found that  $s^R > s^{pc}$ , hence the following Proposition holds:

**Proposition 3:** *In the Certification by the regulator scenario, the CSR effort level standard  $s^R = \min[s^{R*}, s_{pc}^R]$  chosen by the regulator, is always higher comparing to the one chosen by the profit maximizing certifier.*

**For proof see Appendix**

<sup>18</sup>In this case the prevailing equilibrium coincides with the Benchmark case without CSR.

<sup>19</sup>Due to space limits some algebraic formulas are not presented. These are available from the authors upon request.

The intuition behind this result is that in the private certification scenario the private certifier's objective is to maximize each firm's gross profits, so as to maximize the fees to be collected. However, in the certification by the regulator scenario, the regulator, besides firms' profits, also includes net consumers' surplus in his objective function in order to maximize total welfare. As a result CSR effort standard level set by the regulator is always higher than the one set by the private certifier.

### Comparative Analysis

There cannot be obtained an analytical solution regarding the level of CSR effort will the regulator finally set ( $s^{R^*}$  or  $s_{pc}^R$ ). However, in equilibrium, with respect to proposition 3,  $s^{pc} \leq s^R$  always holds. In order to present some qualitative comparative results it is assumed that  $(a - c)$  is sufficiently high, and  $c$  is not too low in order to avoid corner solutions and ensure the concavity in the total welfare function.<sup>20</sup>

Remark 1 stands for the comparison of the market outcomes for the three alternative scenarios:

**Remark 1:** *In the Certification by the regulator scenario, equilibrium output is always lower (higher), firms net profits are equal or higher, consumers' surplus and total welfare are always higher comparing to the ones obtained under the certification by a private organization regime (the benchmark case without CSR activities).*

### For proof see Appendix

The rationale behind output levels is easy to be checked, by considering the arguments for both firms' reaction functions after (4.10). It is analyzed in the appendix that since  $\bar{\theta}/c > s_{pc}^R \geq s^{pc} = \frac{\bar{\theta}}{2c} > 0$ , then  $q^C < q^R < q^{pc}$ , holds. Next, firms' profits are considered. By assumption  $\pi^C = \Pi_{net}^{pc}$ , since the private certifier extracts all extra profits by assumption. However, in the certification by the regulator scenario, with respect to the firms participation constraint to CSR activities, firms profits will be equal or higher to the ones obtained in the alternative scenarios. The reason behind this that since  $s^R = \min[s^{R^*}, s_{pc}^R]$  then if  $s^{R^*} \leq s_{pc}^R$  then the inequality

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<sup>20</sup>This ensures that the relative market size is sufficiently high so that firms can engage in CSR and that the marginal cost that is not connected to CSR is sufficiently high so that firms do not engage in excessive CSR.



holds, while if  $s^{R*} \geq s_{pc}^R$  then profits in all scenarios are equal. In what follows, consumers' surplus is considered. This is increasing in CSR effort. Hence, with respect to proposition 3, since  $s^R \geq s^{pc}$ , then consumers' surplus in the certification by the regulator scenario is equal or higher comparing to the alternative ones. Finally total welfare is higher under the certification by the regulator scenario, than in any alternative configuration. The reason behind this is that there are two opposite effects on total welfare. While the increase in the consumers' surplus due to higher CSR effort in the certification by the regulator leads to higher total welfare under this configuration total profitability in each scenario is inconclusive. However, results in equilibrium reveal that the increase on consumers' surplus dominates, hence total welfare is higher if the certification is provided by the regulator.

#### 4.4 An extension: The case of persuasive advertising

An additional policy instrument by the regulator may be persuasive advertising. Next, the way that persuasive advertising would effect the aforementioned results, is examined. More specifically, following Petrakis et. al. (2005) it is assumed that information provision is conducted via persuasive advertising, which will increase the fraction of socially conscious consumers in the market. This is formalized in the present model as an increase in  $\bar{\theta}$ .

From eq.(4.6) and (4.23) it is easy to check that an increase in  $\bar{\theta}$  enhances the increase in demand for the final good of the firms that engage in CSR. Hence, firms' benefit from CSR increases. This could lead to the increase of CSR effort undertaken by firms, which would amplify consumers' surplus and total welfare also. However, in the present model, for this benefit to be effective, information provision should be combined with certification, or else a "market of lemons problem" is in effect.. Conversely, investing in persuasive advertising imposes an additional cost which decreases total welfare. Thus, the final outcome from information provision via persuasive advertising depends on the relative weigh of each effect on total welfare.

#### 4.5 Conclusions

The present chapter examines the conditions under which the regulator can complement the provision of CSR by private firms. Two alternative scenarios are considered: The first, refers to the case in which a private, profit-maximizing organization provides firms with a credible certificate about their SR activities. The second, considers the case in which the regulator intervenes, by providing the certification himself with respect to total welfare.

The main finding is that if there is no credible information disclosure about SR characteristics of the firms' products to consumers, no firm will have incentives to undertake CSR effort in equilibrium. However, if the necessary information about the CSR aspects of each firm's product, otherwise unobservable, is revealed to consumers through certification, then the opposite holds. More specifically, in equilibrium, both firms' endogenous choice is to engage in CSR activities, hence consumers' surplus and total welfare increase comparing to the benchmark case without CSR activities. It is found that the regulator will set higher standards of CSR effort with respect to firms' participation constraint to CSR comparing to the profit-maximizing certifier. This leads to higher consumers' surplus and total welfare comparing to all alternative configurations.

The analysis was carried out for a duopolistic market structure. To my opinion the duopolistic market provides all essential insights about the firms' owners' incentives to undertake CSR activities. I also am aware of the limitations of the present analysis in assuming specific functional forms. However, it is the nature of the equilibrium conditions that drive the present results that allows one to argue that these results will also hold under general demand and cost functions. The use of more general forms would jeopardize the clarity of the present findings, without significantly changing their qualitative character. Given the current debate about the market and welfare implications of Corporate Social Responsibility the present chapter examines the policy instruments that a regulator may impose, in order to enhance firms' incentives to engage in CSR activities in oligopolistic markets.

## 4.6 Appendix

### Proof of Proposition 2

By comparing output, consumers' surplus and total welfare under the Private Certification

scenario ( $q^{pc}$ ,  $CS_{net}^{pc}$ , and  $TW^{pc}$ ) to the one obtained in the Benchmark case ( $q^C$ ,  $CS^C$  and  $TW^C$ ) one observes that:

$$\begin{aligned} q^{pc} - q^C &= \frac{1}{16c(2+\gamma)} > 0, \\ CS_{net}^{pc} - CS^C &= \frac{96c(a-c)(1+\gamma)^2 + \gamma(22+7\gamma) + 19}{768c^2(1+\gamma)(2+\gamma)^2} > 0, \\ TW^{pc} - TW^C &= \frac{96c(a-c)(1+\gamma)(3+\gamma) + 7\gamma(2+\gamma) + 25}{768c^2(1+\gamma)(2+\gamma)^2} > 0. \end{aligned}$$

### Proof of Proposition 3

If the participation constraint CSR effort is set by the regulator, then

$$s_{pc}^R - s^{pc} = \sqrt{\frac{1}{4} + 4c(a-c) - 4c\sqrt{(a-c)^2 + M(2+\gamma)^2}} > 0, \quad 0 \leq M \leq \frac{[8c(a-c) + \frac{1}{4}]}{32c^2(2+\gamma)^2}.$$

If the optimal CSR effort is set by the regulator, then  $\frac{\partial TW^R}{\partial s} \big|_{s=s^{R*}} = 0$  and  $\frac{\partial TW^R}{\partial s} \big|_{s=s^{pc}} = \frac{1}{24c(1+\gamma)} > 0$ . Hence,  $s^R = \min[s^{R*}, s_{pc}^R] > s^{pc}$ , always.

### Proof of Remark 1

From the analysis of eq.(4.10), one observes that CSR effort has two opposing effects on owner  $i$ 's output decision. On the one hand, positive CSR effort augments the demand for the firms' good and thus tends to increase equilibrium output, through an outward shift of both firms' reaction function. On the other hand, it increases firms' unit costs, tending to decrease equilibrium output via an inwards shift of both firms' reaction functions. For  $0 < s < \bar{\theta}/c$  the first effect is dominant and the CSR effort undertaken by firms shifts their reaction function outwards. This outwards shift increases for  $0 < s < \frac{\bar{\theta}}{2c}$ , attains a maximum for  $s^{pc} = \frac{\bar{\theta}}{2c}$  and decreases for  $\frac{\bar{\theta}}{2c} < s < \bar{\theta}/c$ . It is easy to check that  $s_{pc}^R < \bar{\theta}/c$ , always. At  $s = \bar{\theta}/c$  the two opposing effects neutralize each other, hence, there is no shift on the firms reaction function. Thus, since  $\bar{\theta}/c > s_{pc}^R \geq s^{pc} = \frac{\bar{\theta}}{2c} > 0$ , then  $q^C < q^R < q^{pc}$ , holds.

Note also that from eq.(4.21)  $\frac{\partial CS}{\partial s} = \frac{3(a-p^R) + 2s^R}{3(1+\gamma)} \geq 0$  for  $\bar{\theta}/c \geq s_{pc}^R$ . Since  $\bar{\theta}/c \geq s_{pc}^R \geq s^{pc}$ , then  $CS_{net}^{pc} \leq CS^R$ .

Regarding total welfare from the proof of Proposition 3:  $\frac{\partial TW}{\partial s} \big|_{s=s^{pc}} = \frac{1}{24c(1+\gamma)} > 0$ . Hence, since  $s^R = \min[s^{R*}, s_{pc}^R] > s^{pc}$ , total welfare is lower under the private certification scenario.

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## **Part III**

# **Concluding Remarks-Incentives for Further Research**

Empirical evidence show that modern firms' strategies often include different objectives than strict profit maximization, seeking for competitive advantage in the market they operate. The aim of the current Doctoral Thesis is to shed light on the effects of firms' strategies such as *strategic managerial delegation* and *corporate social responsibility*, to their market performance and total welfare.

In the first chapter, in order to investigate the implications from the alternative delegation strategies (Full or Partial Delegation), to firms' R&D investments and market performance, three possible configurations are compared; the first is the Universal Full Delegation one, the second refers to the Universal Partial Delegation one, while the third is the Coexistence configuration. It is found that R&D investments are higher in Universal FD, than in the Universal PD configuration. If the initial marginal cost is relative low, then firms' profits are higher in Universal FD comparing to the Universal PD configuration. However, this result is reversed when the initial marginal cost grows larger. In the Coexistence configuration, the firm that follows FD (PD) strategy always invests more (less) in R&D, and have higher (lower) profits, than both symmetric delegation configurations.

Next, the configuration that will prevail in equilibrium is investigated, assuming that there is no credible commitment between competing owners, regarding the type of decisions delegated to managers. We find that owners have incentives to deviate from Universal Partial Delegation, always. If the initial unit cost is relative high (low), owners have always (never) incentives to deviate from the Coexistence configuration. If the initial unit cost is relative high (low), owners will never (always) deviate from Universal Full Delegation. Conversely, under the assumption of credible commitment, firms' owners equilibrium choice will be FD, hence, Universal Full Delegation is the unique equilibrium configuration.

In the second chapter, firms' owners' optimal choice over the contract type used to reward their manager, is discussed. Considering the theoretical results, three main testable hypotheses are examined. The first regards the type of contracts that owners will endogenously choose to compensate their managers. The second refers to the relation between the contract type and the degree of aggressiveness chosen by owners. Finally the correlation of the contract type and managerial incentives to the market outcomes.

The main finding is that Relative Performance contracts are significantly more frequent than



Profit-Revenue ones, but (opposite to theory) the result does not depend on whether owners commit on contract types before the contract terms are chosen. Secondly, the prediction of the model concerning a higher aggressiveness of Relative Performance-rewarding owners over their Profit-Revenue rivals is confirmed (partial confirmation of theory). On the contrary, the prediction concerning the ranking of  $\alpha$ 's across symmetric configurations is not supported by the present findings. Furthermore, observing one's rival's commitment on a given contract type, does not affect the average  $\alpha$  used by either Relative Performance-rewarding owners, or Profit-Revenue ones. Finally, output is not responsive to the delegation contract type. However, unclear results regarding the predicted relation between contract terms and aggressiveness, are obtained.

The third chapter explores firms' owners' incentives to engage in corporate social responsibility activities, in the context of an oligopoly, introducing strategic managerial delegation and vertical product differentiation. Owners are given the opportunity to hire a "socially responsible" manager and delegate to him market competition decisions. Delegation of authority from owners to "SR" managers is a credible signal to consumers about the CSR activity policy that the firm is intended to follow. Hence it will increase consumers' valuation for their firm's product. Each SR manager will try to maximize his utility given by the sum of firm's profits plus the additional utility of SR managers that engage in CSR activities.

In equilibrium, both owners' strategy will be to employ an SR manager to compete in the market, because by doing so each owner has the opportunity to obtain competitive advantage against the rival firm. This interaction among competing firms causes equilibrium output and profits to be higher compared with the benchmark case where no CSR activities are undertaken. The analysis of this chapter also reveals that CSR activities increase social welfare.

The last chapter examines the conditions under which the regulator can complement the provision of CSR by private firms. Two alternative scenarios are considered: The first, refers to the case in which a private, profit-maximizing organization provides firms with a credible certificate about their SR activities. The second, considers the case in which the regulator intervenes, by providing the certification himself with respect to total welfare.

If there is no credible information disclosure about SR characteristics of the firms' products to consumers, no firm will have incentives to undertake CSR effort in equilibrium. However, if

the necessary information about the CSR aspects of each firm's product, otherwise unobservable, is revealed to consumers through certification, then the opposite holds. More specifically, in equilibrium, both firms' endogenous choice is to engage in CSR activities, hence consumers' surplus and total welfare increase comparing to the benchmark case without CSR activities. We find that the regulator will set higher standards of CSR effort with respect to firms' participation constraint to CSR comparing to the profit-maximizing certifier. This leads to higher consumers' surplus and total welfare comparing to all alternative configurations.

Last but not least, it is useful to mention some possible extensions of the present Thesis. In the first chapter, it is interesting to check the robustness of the results, if a contract type different than a linear combination of profit and revenue one, is selected. For instance, a linear combination of profits and relative performance type of contract can be proposed. The second chapter is hopefully the starting point for a re-consideration of oligopoly delegation towards frameworks inspired on the rapidly growing behavioral economics literature. The examination of issues concerning fairness and reciprocity can link the oligopoly delegation framework to a more behavioral approach. This is certainly an underinvestigated aspect of managerial incentives. The third chapter can become the starting point of empirical research on the issue of CSR incentives from firms' owners to managers. More specifically, the correlation between CSR managerial incentives and important factors to the overall performance of the firm, such as the degree of competition in the market and consumers' willingness to pay for SR products, can contribute to the discussion regarding firms incentives to engage in CSR activities. Finally, alternative ways that the regulator may employ in order to enhance the provision of CSR, deserve further attention. For instance policy instruments, such as information provision to consumers about CSR, may increase their valuation for the SR oriented products, hence firms' incentives to undertake CSR.

The analysis was carried out for a duopolistic market structure. I believe that the duopolistic market provides all essential insights about the effects of firms' engagement on strategic managerial delegation and corporate social responsibility, to their market performance and total welfare. I also am aware of the limitations of the current analysis, in assuming specific functional forms. However, it is the nature of the equilibrium conditions that drive the obtained results that support the argument that these results will also hold under general demand and

cost functions. The use of more general forms would jeopardize the clarity of the present findings, without significantly changing their qualitative character.