外部知識、可容忍合作成本及共同撰寫

摘要

本論文旨在建立一個包含 2 個玩家的序列賽局，來分析外部知識存量、知識外部性及可容忍合作成本，對於個人與他人合作的決策及兩人籌組共同撰寫(co-authorship)的影響。在本論文的模型中，我們放寬了外部知識對個人的知識生產行為上有正外部性及負外部性的影響。

在第二章中，我們推導出個人參與共同撰寫的意願會受到其個人可容忍合作成本的影響，而個人的可容忍合作成本會被合作得利、個人本身及合作對象的努力成本所影響。本論文是首篇文章推論知識外部性(正、負外部性)及外部知識存量會影響個人參與共同撰寫的決策。

在第三章中，我們使用可容忍合作成本及考慮兩位學者在具有相同的知識外部性之下，分析外部知識存量的膨脹對於個人參與共同撰寫意願的影響。我們發現當兩位學者同時具有正外部性(大的負外部性)時，與他人合作共同撰寫的意願會隨著外部知識的增加而遞增(遞減)，而有趣的是當兩位學者同時具有小的負外部性時，其個人參與共同撰寫的意願也會隨著外部知識的增加而遞增。我們也同時預測外部知識存量的膨脹對形成共同撰寫機率之影響，當兩位學者具有相同之正外部性或小的負外部性時，形成共同撰寫的機率會隨著外部知識存量的增加而遞增；當兩學者具有相同之大的負外部性時，共同撰寫的形成機率剛開始時會隨著外部知識存量增加而遞減，但隨後會反而遞增，形成 U 型的曲線。

在第四章中，我們同樣使用可容忍合作成本，但考慮在兩位學者具有不相同的知識外部性時，外部知識存量的膨脹對於個人參與共同撰寫意願的影響。我們發現，當兩位學者同時具有正外部性或小的負外部性時，個人參與共同撰寫的意

願會隨著外部知識存量的增加而不斷遞增；當兩學者具有相反的外部性(其中一位具有正或小的負外部性，而另一位具有大的負部性)或兩學者同時具有大的外部性，其個人參與共同撰寫的意願剛開始時會隨著外部知識存量增加而遞減，但隨後會反而遞增，形成 U 型的曲線。在共同撰寫的形成機率方面，當兩學者同時具有正外部性或小的負外部性時，形成共同撰寫的機率會隨著外部知識存量的增加而遞增；當兩學者具有相反的外部性(其中一位具有正或小的負外部性，而另一位具有大的負部性)或兩學者同時具有大的外部性時，共同撰寫的形成機率剛開始時會隨著外部知識存量增加而遞減，但隨後會反而遞增，形成 U 型的曲線。在知識存量膨脹的時代裡，長期而言，我們的結果發現兩學者均願意相互合作，進行共同撰寫，與 Jackson and Watts (2002)的結果相同。

第五章總結本論文，並提出往後研究的延伸議題。

關鍵字：共同撰寫、外部知識存量、外部性、可容忍合作成本、共同撰寫的形成機率。

External Knowledge, Tolerable Coordination Cost and Co-authorship

Abstract

This dissertation constructs a two-player sequential game to investigate the impacts of external knowledge stock, knowledge externality and tolerable coordination cost on individual's decision-making in forming a link and the propensity for two authors in forming a co-authorship. In our model, we relax the assumption that the knowledge may exert positive and negative externality on an author's knowledge production.

In chapter 2, we deduce an individual's likelihood to participate in collaboration is affected by his tolerable coordination cost. We show that this tolerable coordination cost is influenced by the benefit gains due to collaboration, an author's own and his partner's costs of effort. Specifically, this dissertation is the first to conclude that the knowledge externalities (positive and negative) and the external knowledge stock affect an author's decision-making to engage in collaboration or not.

In chapter 3, we examine the effects of expanding external knowledge stock on individual's incentive to coauthor with others in the case of two authors have symmetric externalities. Our findings conclude that an academic with net positive (large negative)

knowledge externality is more (less) likely to engage in co-authorship as external knowledge stock accumulates. Interestingly, the growing external knowledge promotes an academic with small negative knowledge externality to participate in scientific collaboration. Our model also predicts the impact of expanding external knowledge stock on two authors forming scientific collaboration. In an increased external knowledge stock, we predict that the propensity for two academics with positive knowledge externality forming co-authorship is always rising. This finding is surprisingly evident when two academics have small negative knowledge externality. In addition, we predict that the propensity for two academics with large negative knowledge externality forming co-authorship declines initially but rises gradually as external knowledge stock accumulates.

In chapter 4, we re-examine the effects of growing external knowledge stock on individual's willingness to coauthor with each other for two authors have asymmetric externalities. We can conclude that an author's willingness to engage in collaboration is always increasing in growing external knowledge stock for he and his partner have positive or small negative externalities at the same time. But an author's willingness to join co-authorship declines initially but rises ultimately as the external knowledge

grows whilst two authors have opposite externalities: one has a positive or small negative externality and another has a large negative externality, or two authors have large externalities at the same time. We also characterize the impacts of growing external knowledge stock on propensity for two authors forming co-authorship if they both have asymmetrical externalities. In the age of knowledge explosion, co-authorship seems more likely to occur when two authors have positive or small negative externalities. Whilst the incidence of co-authorship declines initially but raises gradually in the case of two authors have opposite externalities: one has a positive or small negative externality and another has a large negative externality, or two authors have large externalities at the same time.

Keywords: Co-authorship, External knowledge stock, Externality, Tolerable coordination costs, Propensity of forming co-authorship.