# The Distribution of Co-Authored Returns in the Field of Economics

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**ABSTRACT.** Partnerships exist in many areas of social and economic field. Such relationships are becoming more prevalent in R&D activities, as organizations increasingly seek partners to complement their technical capabilities. R&D partnerships are challenging because efficiency of collaboration and conditions for achieving it are not yet fully understood. This paper explores the distribution of benefits and losses of co-authors in academic paper publication by scholars with asymmetric backgrounds, distinguishing between short-term relative returns (the increase or decrease of a co-authored article relative to the author's previous citations) and long-term returns (the increase or decrease of citations after co-authored work). The factors that drive the returns (benefits or losses) of junior and senior co-authors vary, and some are even driven by opposite factors. Co-author resources have a greater impact on senior scholars than junior academic partners.

## 1. INTRODUCTION

Partnerships can be found in all areas of social and economic life: business, art, science, politics. In the 1960s, the proportion of economics papers co-authored rose from less than 20 per cent in the 20th century to more than 60 per cent in the 1990s. [1]This growing trend is driven by a number of factors, such as increasing the specialization of research to make it more efficient, the convenience of agreeing to co-authors, and the self-interest of researchers to seek the rewards, reputations, and resources offered by collaborative networks. [2]

The increase of co-authors brings many problems to scientific research evaluation, such as: how to distribute the contributions of co-authors? Should all authors be punished if a published paper goes wrong? How does a large number of co-authors contribute to identification? False signature problem and use false signature to declare various projects and awards, etc. [3] Among them, there are the most researches and debates on contribution distribution of co-authored papers. Various schemes emerge one after another, but no unified scientific and reasonable solution has been formed up to now. The objective and fair distribution of the contributions of the co-authors is not only related to the proper measurement of the scientific research performance of the researchers, but also related to the maintenance of a good scientific research moral order. [4]

## 2. THEORETICAL BACKGROUND

### 2.1. Asymmetric business alliances

Asymmetric alliances are selected to acquire new capabilities, which are common in R&D collaborations, and present significant management challenges. [5] There are various theoretical frameworks in asymmetric business alliances: transaction cost theory, game theory, resource-based theory, social network, trust theory and so on. These frameworks generally apply to "inter-organizational" partnerships. However, co-authored publications cannot simply be viewed as interpersonal collaboration. [6]

## 2.2. Business cooperation theory

The resource-based theory and relational asset theory of enterprises are more relevant to the research problem of this paper.

The resource-based theory holds that companies gain competitive advantage through their unique assets and capabilities, which cannot be easily replicated. With the change of market and technology environment, enterprises often face the shortage of resources and need to obtain new resources. [7] Cooperation is not only to obtain new resources, but also to make better use of one's own resources. Contractual relations and relational transactions, the first category refers to the exchange parties do not consider their future exchanges, regarded as "one-time" transactions; The second type of exchange is influenced by future views and may also affect the relationship between the parties. The theory of relationship assets emphasizes the quality of relationships with existing partners. The term "relationship quality" is defined as "the degree to which a partner's principals and agents feel confident in dealing with the other organization." Companies are embedded in a network of relationships with business partners (such as customers, suppliers, and supplicants) who constantly exchange goods and information. These repeated interactions shape their understanding of the market, their strategy, and their performance, and when choosing a new partner for a major strategic move, the choice is deeply influenced by the previous relationship. According to this theory, organizations are more likely to work with companies that have good relationships because it allows them to work efficiently. [8]

This paper discusses the co-authors from the two complementary perspectives of resources and relationships, and analyses to what extent the resources owned by the two authors and their previous relationships affect the benefits they obtain from their cooperation and the distribution of the benefits.
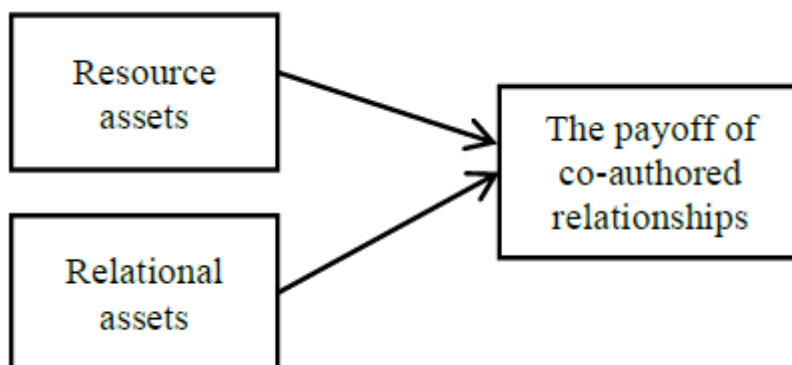


Figure 1  Two theories of co-authored returns

## 3. Model design and research hypothesis

### 3.1. Background of the Research model

Our research model aims to understand the factors that drive co-authors' returns (i.e., benefits and losses), particularly the distribution of asymmetric resources between two co-authors. Authors are rewarded by the quality of the resources (what the two co-authors have) and their relationships (such as the quality of the collaboration). Co-author resources are expressed in terms of ability, reputation, or experience. Relationship assets are valued through co-authored articles (i.e., the experience of the co-authors) and ease of coordination (i.e., geographical proximity).

This paper divides the returns generated by co-author into two types. The first type of return is short-term return, which is measured by the exposure of articles co-authored with famous co-authors. The second type of reward is the long-term reward, which is assessed by the author's subsequent publication of the article after the co-author has co-authored it. The short-term return is the difference between the number of citations obtained in the co-authored article and the average number of citations before it; The long-term return is the difference between the average number of citations after the co-authored article and the average number of citations before.

This paper selects articles published by two co-authors. The first author is the author selected by random process; The other author is selected from a group of co-authors of the first author and is referred to as a "co-author".

## 3.2. Research model

The model examines how the quality of available resources and relationships with co-authors affect the distribution of earnings between co-authors and evaluates this relationship through regression analysis.
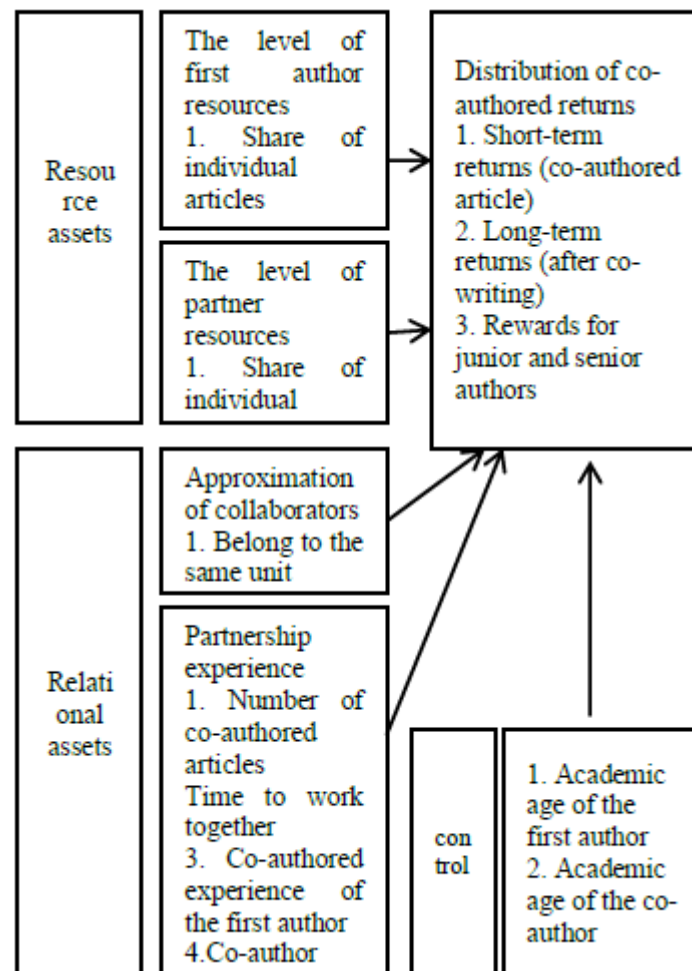


Figure2 Factors that influence co-author returns

## 3.3. Hypothesis formulation

**Hypothesis 1.1** the higher the share of articles written by the first author alone, the better the return.

**Hypothesis 1.2** the higher the share of articles written by co-authors individually, the better the returns.

**Hypothesis 2.1** different institutional affiliation is associated with better co-author returns.

**Hypothesis 3.1** the more co-authors the first author has, the better the co-authors' return to the two partners will be.

**Hypothesis 3.2** the more co-authors there are, the better the co-authors' return to both partners will be.

**Hypothesis 3.3** the more articles co-authored, the better the co-authored return to both partners.

**Hypothesis 3.4** the longer the co-authorisation, the better the co-authorisation returns to both partners.

## 4. Data

The data came from the China national knowledge network (CNKI). Literature on economics was screened out from the CNKI database, and a sub-sample of 100 authors was randomly selected from the authors of these literatures as the co-authors. For each co-authored first author, all their articles in 2014 were screened out, and an article co-authored by two people was randomly selected from these articles as the object of our study, and the co-author was the second author of this article. By construction, the sample is almost entirely composed of articles by asymmetric co-authors.

(1) co-author time: the number of years between the first article co-authored by the two authors and 2014.

(2) number of co-authored articles: the total number of co-authored articles by two authors as of 2014.

(3) same unit: whether the two authors are the same, is marked 1, is not marked 0.

Table 1  Descriptive statistic

|  | N | Minimum | maximum | mean | standard deviation |
|---|---|---|---|---|---|
| Co-author time | 100 | 0.00 | 10.00 | 3.2700 | 2.56178 |
| Number of co-authored articles | 100 | 1.00 | 26.00 | 3.8800 | 3.05598 |
| The same unit | 100 | 0.00 | 1.00 | 0.5300 | 0.50161 |
| Academic age 1 | 100 | 2.00 | 40.00 | 15.2200 | 7.42175 |
| Write the article separately proportional to 1 | 100 | 0.00 | 0.85 | 0.3412 | 0.19059 |
| Co-author 1 | 100 | 2.00 | 93.00 | 23.8700 | 17.26833 |
| Academic age 2 | 100 | 0.00 | 38.00 | 10.1600 | 7.95406 |
| Write the essay ratio 2 separately | 100 | 0.00 | 0.73 | 0.2442 | 0.16791 |
| Co-authors 2 | 100 | 1.00 | 63.00 | 19.5900 | 14.88413 |
| Short-term return 1 | 100 | -11.23 | 4.70 | -2.4492 | 2.73189 |
| Long-term return 1 | 100 | -14.93 | 3.50 | -2.5825 | 2.69306 |
| Short-term return 2 | 100 | -5.10 | 7.80 | 2.7476 | 2.39135 |
| Long-term return 2 | 100 | -4.03 | 8.55 | 2.3847 | 2.31490 |
| Valid N (list state) | 100 | - | - | - | - |

(4) academic age: the academic ages of the two authors are expressed by the difference between the time they published the first article and the year 2015.

(5) proportion of articles written alone: the proportion of the total number of articles written by two authors in their total number of articles.

(6) number of co-authors: the total number of co-authors of the two authors.

(7) short-term return is the difference between the number of citations obtained by the co-author and the average number of citations obtained by the author in the previous two years. So a positive is a gain and a negative is a loss.

(8) long-term return (subsequent articles) is the difference between the average number of citations of articles two years after the co-authored article and the average number of citations of articles in the previous two years.

Table 1 provides descriptive statistics for the population sample and descriptive data for the first author and co-authors, respectively. In group A data, we considered two different dependent variables of regression; Group B gives the corresponding independent variables.

## 5. Results and Implications

Table 2-3 provide regression analysis of dependent and independent variables (long-term and short-term returns of the first author and co-authors), that is, regression analysis of long-term and short-term co-authored returns of the first author and co-authors.

## 5.1. Results

Group A in table 1 shows that the average gain (or loss) of the first author was less (or more) than the average for all authors in our data in terms of short-term and long-term returns. In terms of explanatory variables, group B in table 1 reflects the asymmetry between the first author and the co-authors, which is consistent with the construction of our sample. On average, the academic age of the second author is younger, the number of co-authors in the academic network is lower, and the share of individual articles is lower. The first author was cited more often across the sample, in other words, there was an asymmetry between the first author (" advanced ") and the author (" elementary ") across the sample. Together, these results confirm that the sample is indeed composed mainly of asymmetric scholars.

In table 1, academic age 1 is the academic age of the first author, academic age 2 is the academic age of the co-author, others marked 1 are the relevant information of the first author, and those marked 2 are the relevant information of the co-author.

## 5.2. Implications

Studies have shown that in the case of asymmetric co- writing, short-term and long-term returns may not always be positive and may turn into losses. The benefits of co- writing are often detrimental to senior scholars and relatively beneficial to junior scholars, resulting in very different reasons for gains and losses.

It may be difficult for the co-authored articles to surpass the previous records. In co-authored works, junior scholars can choose scholars from different units who have more co-authored articles and whose previous articles are of higher quality in order to obtain better long-term returns. In contrast, senior authors who want to get a lot of citations should choose younger, less experienced, high-potential co-authors.

Table 2 The first author's long term returns

| Model | Non-standardized coefficient Minimum | | The standard coefficient | t | Sig. |
|---|---|---|---|---|---|
| | B | Standard error | | | |
| (constant) | -4.892 | 0.992 | - | -4.933 | 0.000 |
| Co-author time | -0.644 | 0.114 | -0.627 | -6.008 | 0.003 |
| Number of co-authored articles | 0.527 | 0.095 | 0.557 | 5.376 | 0.020 |
| The same unit | -0.688 | 0.531 | -0.128 | -1.297 | 0.198 |
| Academic age 1 | 0.022 | 0.038 | 0.061 | 0.589 | 0.557 |
| Write the article separately proportional to 1 | 0.449 | 1.421 | 0.032 | 0.316 | 0.753 |
| Co-author 1 | -0.006 | 0.017 | -0.035 | -0.329 | 0.743 |
| Academic age 2 | 0.042 | 0.037 | 0.123 | 1.108 | 0.271 |
| Write the essay ratio 2 separately | -3.813 | 1.667 | -0.238 | -2.287 | 0.025 |
| Co-authors 2 | 0.024 | 0.019 | 0.134 | 1.248 | 0.215 |

Table 3 Co-authors' long term returns

| Model | Non-standardized coefficient Minimum | | The standard coefficient | t | Sig. |
|---|---|---|---|---|---|
| | B | Standard error | | | |
| (constant) | -1.050 | 0.774 | - | -1.357 | 0.178 |
| Co-author time | -0.122 | 0.089 | -0.135 | -1.369 | 0.174 |
| Number of co-authored articles | 0.447 | 0.474 | 0.461 | 0.625 | 0.533 |
| The same unit | -0.418 | 0.414 | -0.091 | -1.008 | 0.316 |
| Academic age 1 | 0.054 | 0.030 | 0.174 | 1.839 | 0.069 |
| Write the article separately proportional to 1 | -1.967 | 1.109 | -0.162 | -1.774 | 0.079 |
| Co-author 1 | 0.026 | 0.013 | 0.194 | 1.983 | 0.050 |
| Academic age 2 | 0.074 | 0.029 | 0.256 | 2.543 | 0.013 |
| Write the essay ratio 2 separately | 2.379 | 1.301 | 0.173 | 1.828 | 0.071 |
| Co-authors 2 | -0.017 | 0.015 | -0.111 | -1.134 | 0.260 |

## 6. CONCLUSION

This paper discusses the income distribution of co-authors with asymmetric resources and measures the author's income by comparing the number of paper citations before and after co-authored articles. Asymmetrical co- writing is not always driven by interest, but more likely by the academic aid of older and more senior scholars to younger ones.

## Acknowledgment

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