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1

Introduction

Yew-Kwang Ng

The widespread use of the Internet and the associated emergence of e-commerce have significantly changed our lives and are going to have an increasing impact on the world economy. With the increase of internet use and e-commerce, informational and transaction costs are reduced dramatically. As with any network (such as the telephone system), the greater the number of people using the Internet, the more useful it is to its users. Thus, with the expected explosion in the number of users in the near future, the benefits of internet use and e-commerce will increase dramatically. Just as in e-commerce, in the division of labour in the economy, transaction costs and networking effects also play important roles. On the one hand, the division of labour allows each individual to specialize more, tapping the economies of specialization. A larger network of division of labour allows more of such economies to be enjoyed. On the other hand, specialization necessitates more trade, which involves transaction costs. In fact, the optimal tradeoff between the economies of specialization through the network of division of labour and the transaction costs of the required exchanges is a central aspect of the Yang–Ng framework of inframarginal analysis (on which more below) of the network of division of labour and the associated economic organization and its evolution. As both e-commerce and economic organization are closely associated with transaction costs and networking effects, it is natural that both may be amenable to the same framework of analysis.

Classical economists, including Adam Smith, regarded the division of labour, to take advantage of the economies of specialization, as the principal economic mechanism for increasing the wealth of nations. However, with their focus on marginal analysis (comparing more or less of some variables, like how many apples to buy, how much labour to employ), orthodox economists after the neoclassical revolution have largely ignored the principal problem of classical economics. A group of researchers originating mainly from Monash University, led by Professors Xiaokai Yang and Yew-Kwang Ng (the defining work being their joint book *Specialization*

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and *Economic Organization*, 1993), 'attempt[s] to shift the focus back to specialization and the division of labour' (Smythe, *Journal of Economic Literature*, 1994, p. 691). (A more reader-friendly text is Yang, *Economics: the Neoclassical versus Neoclassical Approaches*, 2001.)

With specialization, one chooses to become either an accountant, an economist, or a lawyer rather than deciding how many hours of accounting work to do or how many hours to allocate to physics problems. One chooses between different corners of specialization. For such choices, marginal analysis is insufficient to give adequate guidance. Yang and Ng devised an analytical method to compare the different corners of specialization not only for an individual, but also for the whole economy. The focus in their work is on the tradeoff between the economies of specialization and transaction costs. It uses traditional marginal analysis as well as inframarginal analysis of total costs and benefits of the different corners. This allows the choice of different occupations (which good to produce, whether to become an employee, or whether to set up a firm), different degrees of specialization (how much home production is engaged), and, for the economy, different economic organizations or structures to be analysed at the fundamental level of individual utility maximization. Rather than assumed as exogenously given, degrees of specialization and organizational structures are outcomes of individual optimization and their interaction. Classical problems are analysed using modern mathematical economic tools. This analysis covers the emergence and enlargement of trade from autarky to globalization, economic growth, industrialization, urbanization, the emergence of firms and multinational corporations, the role of property rights, the effects of e-commerce and so on. It has conceptual as well as practical significance for many economic problems.

Professor James Buchanan calls the increasing returns from the economies of specialization made possible by the division of labour 'generalized increasing returns'. He also regards the work of the Monash group, Yang in particular, as the most exciting item of economic research in the world today. He organized a workshop at the Virginia Polytechnic and State University with NSF support in June 2002, with lectures by Yang, Ng and Heling Shi and others to an invited group of US economists and graduate students. More workshops have been held or are being planned in Australia and China.

The international symposium at Monash University in July 2001 focused on not only the inframarginal analysis of networking decisions but also its relevance for analysing and explaining e-commerce and its effects.

This volume is divided into four parts. Part I comprises keynote speeches at the conference. The chapter by Ng outlines the basics of the Yang–Ng framework of inframarginal analysis and its role in the analysis of the network of the division of labour and the associated evolution of economic organization. The internet revolution and the associated growth of

e-commerce, through dramatically reducing the costs of transaction, may lead to a larger network of division of labour and higher economies of specialization. Examples (such as infrastructure provision, bundling sales, unusual high P/E ratios of many e-commerce companies, and the aggregate risk of coordination failure) are used to illustrate the differences between marginal analysis and inframarginal analysis.

The chapter by Yang provides a detailed and up-to-date review of the rapidly growing literature (including basic theoretical research, applied theories, and empirical studies) of inframarginal analysis of the division of labour, identifying its distinctive characteristics. It outlines major criticisms of this literature, including those emerging from the refereeing process. It then identifies those criticisms that have already been satisfactorily absorbed and those that have yet to be satisfactorily addressed by researchers into inframarginal analysis. Possible future developments are also discussed.

E-commerce and networking decisions

Part II comprises five chapters which cover quite diverse fields. The first chapter provides a framework linking the specific features of e-commerce with the recent literature on economics of transaction costs and the network of the division of labour. This is followed by two theoretical chapters examining two distinctive aspects of e-commerce: bundling sales and exchange intermediary. E-commerce raises various legal issues, and one of them is the validity of online contracts. The fourth chapter in this section provides a comparative study of the online contract legislations in several jurisdictions and concludes that remedies should be introduced to reduce the uncertainty on the legal status of online contracting. The final chapter in this part offers a case study on the adoption of e-commerce in China.

The first chapter, by Shi and Mathysen, is written from the business perspective, and argues that e-commerce will mainly influence transaction costs and therefore provides a convincing linkage to the existing literature on the economics of transactions costs. The essay classifies various forms of transaction costs in market exchange, such as search costs, consumer acquisition costs, uncertainty regarding quality, opportunistic behaviour, and negotiation costs. It also deals with agency costs within an organization, such as information distortion, monitoring and measurement costs, and the decrease in managerial capability. Moreover, their work illustrates that the adoption of e-commerce will affect these costs in different ways and to differing extents. Accordingly, e-commerce will affect the optimal organizational format. The authors push forward this transmission mechanism to explain some observations in the real world, such as the optimal size of the firm, vertical integration and horizontal expansion, the replacement of international trade by foreign direct investment, and so on.

The next chapter, by Yang, addresses a current controversy associated with e-commerce, that is, whether e-commerce will eliminate or reduce the role of entrepreneurs. Casual observations indicate the coexistence of two opposite trends: some middle persons permanently disappear, while some new species of middle persons emerge. Yang's chapter provides a theoretical foundation which predicts that the relative movement of transaction costs in markets is the driving force for the disappearance and emergence of the wholesaler-retailer-customer chain. So, it is not insightful to talk about whether e-commerce will reduce the role of middle persons or not; rather, understanding how e-commerce is going to relatively affect the efficiency of transaction in different markets offers much more predictive power.

Li's chapter constructs a general equilibrium model on bundling sales, which is regarded by the author as one of the more common business practices in e-commerce. Prior to this chapter, bundling sales have traditionally been regarded as a business strategy to exercise price discrimination and monopoly power. Bundling sales is not sustainable in a competitive environment. The author argues that with the existence of transaction costs in pricing a good, bundling sales can be used to reduce pricing costs. If the endogenous transaction costs of not pricing is lower than the exogenous transaction costs of pricing such a good, then not pricing a good, and hence bundling sales, will become the equilibrium phenomenon, regardless of the market structure – monopoly or competitive.

The contribution of Field is unique in that it documents the current legal status of online contracts under various jurisdictions. As an Australian, the author is very comforted to notice that the legislative programme adopted in Australia and the gradual introduction of the electronic transaction legislation would appear to place Australia in a position comparable to that of its trading partners. However, the author notices that the selfsame legislation in Australia, the *Electronic Transactions Act*, still leaves some basic questions of the law of contract unanswered. Much of the law of contract as applied in Australia is based on the Common Law as developed by the courts over the decades, bound by the doctrine of precedent; and so far, this law has not yet been applied in a legal contest by the said courts to an electronic contract formed over the Internet. So, the question hinges upon whether this law can be carried over to cover online contracts. The editors decided to include this essay in this economic theory-dominated volume because it provides a detailed case study showing how the uncertainty in legislation could significantly increase the transaction costs in using e-commerce to do business.

Wong and Wong use the survey data compiled by the China Internet Network Information Center (CNNIC) to present a snapshot of the utilization of e-commerce in China and report on the factors contributing to the rapid growth of e-commerce in China since then. Infrastructure

development is regarded as being the single largest factor contributing to the exponential growth of the sector. However, some institutional flaws, especially the dominance of the rigid state-owned enterprises, the lack of financial strength of the private sector SMEs (small and medium-sized enterprises), and the prevailing business culture, are preventing the B2B and B2C e-commerce models from developing further. Given this point, the author is confident that the WTO accession will overcome these institutional obstacles to accelerate the adoption of e-commerce in China.

Impersonal networking and endogenous specialization

Part III is devoted to equilibrium analyses of the structure of the division of labour, which emerges from the interaction between the decentralized Walrasian decisions guided by price signals. The authors argue that a very important function of the market is to coordinate individuals' decisions in choosing their patterns of specialization, and that many issues, such as direct foreign investment and time allocation, can be well understood as one aspect or another of the progressive (international) division of labour.

The chapter by Sun, Yang and Yao develops an analytical framework with both increasing returns and transaction costs to show that an impersonal network of the division of labour emerges from the interactions between the Walrasian decisions of self-interested and *ex ante* identical individuals guided by price signals and that the emergent network structure of the division of labour is efficient. Within this analytical framework, the notion of the decentralized coordination of the division of labour by competitive markets (which has been a long-standing tradition in economics) can be resurrected in a modern body of formal analysis. The authors argue that a most important function of the market is to coordinate individuals' decisions in choosing their patterns of specialization in order to fully exploit the positive network effects of division of labour net of transaction costs. As such, their analysis may be seen as a starting point toward the theoretical foundation of the studies of impersonal networking decisions.

Although Sun, Yang and Yao's chapter, and some other theoretical analyses as well, may serve as a theoretical foundation for analysing many important issues, yet many interesting models with intra- and inter-firm division of labour among *ex ante* heterogeneous agents are still not tractable by the existing toolkit, thus presenting a technically challenging problem that needs to be overcome. The chapter by Sun develops a new method for identifying equilibria and conducting comparative statics of structures of the division of labour to fill this void. The method starts with the analysis of individuals' decisions on specialization under given price signals, and then solves for the equilibria and comparative statics in one step, resulting in a complete characterization of subspaces of parameters in which different structures of specialization occur in equilibrium. This

approach proves particularly powerful in dealing with models with substitutions between markets (for products and those for labour) and/or *ex ante* heterogeneous agents. In addition, the new approach may help to analyse some theoretical issues in the new classical microeconomic framework.

While the contributions of Sun, Yang and Yao and Sun are both mainly theoretical, the chapter by Dexin Yang introduces an interesting analysis of how foreign direct investment may emerge from the international division of labour. To that end, the author develops a general equilibrium model, which combines the inframarginal theory of the firm developed by Yang and Ng on the one hand, and the international division of labour based on both exogenous and endogenous comparative advantages on the other. As such, a kind of unifying framework for analysing direct foreign investment may be developed.

Time allocation has long been a topic of interest to many theorists. The chapter of Lio addresses the implication of the progressive division of labour for time allocation by developing a model with endogenous specialization and the tradeoff between economies of specialization and transaction costs. This analysis shows that the level of the division of labour, the extent of the market, the level of specialization, productivity, the time spent on consumption activities, the consumption diversity, and per capita real income increase concurrently as transaction efficiency is improved. Perhaps more importantly, the author proves that, under certain conditions, a stronger desire for leisure could have a positive effect on productivity by promoting the development of division of labour if people have a strong preference for diversified consumption.

Transaction costs and division of labour

Although it is well known in the economics profession that transaction costs have profound implications for economic performance in general and for economic organization in particular, the appropriate way to measure and identify transaction costs for a given economy or a firm has long been controversial and still remains a challenging task. Some new efforts in furthering this goal are made in Part IV of this volume.

The contribution of Rivers introduces an indirect approach to the measurement of transaction costs, wherein some proxies are proposed to measure transaction costs associated with the exchange of intermediate goods (services), as well as those associated with the exchange of labour. His analysis begins with a category of transaction costs: *ex ante* or *ex post* costs of market exchange. The former consists of information (search) costs and contract negotiation costs and the latter classified as contract enforcement costs, coordination costs, external arbitration costs and holdup costs. For each subclass of transaction costs, some appropriate practical proxies are proposed. The identification and measurement of transaction costs are

an important step towards a complete characterization of what is usually rather loosely referred to as 'transaction costs'.

Lio and Liu's empirical study regarding the relationship between transaction costs and economic structural changes related to the division of labour is complementary to Rivers' work. Specifically, their study empirically examines the urbanization theory of Yang and Rice, using a cross-country data set for 1996 obtained from the *2001 World Development Indicators CD-Rom* published by the World Bank. Their analysis shows that transaction efficiency has strong positive effects on the level of urbanization, strong negative effects on the share of the labour force in agriculture, and strong positive effects on per capita real income. A substantial positive relationship is found between the level of urbanization and per capita real income, while a substantial negative relationship is found between the share of the labour force in agriculture and per capita real income. That the division of labour mediates the positive relationship between transaction efficiency and per capita real income and induces economic structural changes, which is predicted by Yang and Rice's theory, is confirmed.

The contribution of Yang and Zhao is concerned with endogenous transaction costs and the division of labour. Their essay develops a general equilibrium model with alternating offer bargaining and endogenous specialization to investigate the interplay between the network effects of division of labour and endogenous transaction costs caused by strategic interactions. It skilfully demonstrates the negative effects of endogenous transaction costs on the division of labour and on welfare, and posits that the endogenous transaction cost problem may be nonetheless much less serious if players have incentives to care about their reputation. A surprising result produced by this model is that endogenous transaction costs and the level of the division of labour may increase side by side as an exogenous trading efficiency coefficient increases due to complicated interplays between endogenous and exogenous transaction costs and positive network effects of division of labour on aggregate productivity.

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