



Notes

# On the importance of uniform sharing rules for efficient matching <sup>☆</sup>

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## Abstract

The paper provides a possible explanation for the occurrence of uniform, fixed-proportion rules for sharing surplus in two-sided markets. We study a two-sided matching model with transferable utility where agents are characterized by privately known, multi-dimensional attributes that jointly determine the surplus of each potential partnership. We ask the following question: for what divisions of surplus within matched pairs is it possible to implement the efficient (surplus-maximizing) matching? Our main result shows that the only robust rules compatible with efficient matching are those that divide realized surplus in a fixed proportion, independently of the attributes of the pair's members: each agent must expect to get the same fixed percentage of surplus in every conceivable match. A more permissive result is obtained for one-dimensional attributes and supermodular surplus functions.

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## 1. Introduction

The occurrence of uniform, linear rules for sharing surplus among matched agents in a two-sided market – shares that do not vary across matches and are not subject to negotiation – is a widespread and somewhat puzzling phenomenon. For illustration, consider the German law governing the sharing of profit among a public sector employer and an employee arising from the employee's invention activity. Outside universities – where, presumably, the probability of an employee making a job-related discovery is either nil or very low – the law allows any *ex-ante* negotiated contract governing profit sharing (see §40-1 in [Gesetz über Arbeitnehmererfindungen, 1957](#)). In marked contrast, independently of circumstances, any university and any researcher working there must divide the profit from the researcher's invention according to a *fixed 30%–70% rule*, with the employee getting the 30% share (see §42-4).

While the above illustration represented a highly regulated system where the fixed sharing rule is implemented by regulatory fiat, similar arrangements are found in many less regulated environments.<sup>2</sup>

Newbery and Stiglitz (1979) and Allen (1985), among many others, noted that sharecropping contracts in many rural economies involve shares of around one half for landlord and tenant.<sup>3</sup> This division is observed in widely differing circumstances and has persisted for a considerable length of time.<sup>4</sup> The sharecropping literature focused on moral hazard and risk sharing effects – that are absent from our analysis – to explain the continued usage of sharecropping contracts. But, it does not explain the observed uniformity of sharing rules. In this paper, we show that from a mechanism design perspective, uniform, linear sharing rules are important for facilitating efficient matching under incomplete information.

We study a two-sided one-to-one matching (or assignment) market with transferable utility and with a finite number of privately informed agents, called “workers” and “employers.” Agents are characterized by multi-dimensional, privately known attributes that jointly determine the value/surplus created by each employer–worker pair. Thus, we discard the prevalent assumption in most incomplete information studies whereby agents can be described by a single trait such as skill, technology, wealth, or education. This is often not tenable, as workers, say, have many diverse job-relevant characteristics, which are only partially correlated.<sup>5</sup>

We take as primitives the agents' utilities from a match in the absence of additional payments – these objects were aptly called “premuneration values” by Mailath et al. (2012, 2013). These authors also described how premuneration values are shaped by the allocation of property rights: for instance, standardized contracts, as illustrated above, might specify various claims to shares of ex-post realized surplus in every formed partnership. We call the sum of employer and worker premuneration values the match surplus.<sup>6</sup>

<sup>2</sup> In fact, roughly uniform rules for sharing profits from inventive activity are also found across the decentralized university system in the US.

<sup>3</sup> The French and Italian words for “sharecropping” literally mean “50–50 split.”

<sup>4</sup> For example, Chao (1983) noted that a fixed 50–50 ratio was prevalent in China for more than 2000 years.

<sup>5</sup> Tinbergen (1956) pioneered the analysis of labor markets where jobs and workers are described by several characteristics. The seminal (complete information) studies of assignment models with traders characterized by multi-dimensional attributes are Shapley and Shubik (1971) and Gretzky et al. (1992). Dizdar (2012) generalized the matching cum ex-ante investment model due to Cole et al. (2001) along this line, using tools from optimal transport theory. See Villani (2009) for an excellent textbook.

<sup>6</sup> Thus, our model is an incomplete information, interdependent values version of the classical assignment game models of Shapley and Shubik (1971), Crawford and Knoer (1981) and Kelso and Crawford (1982).

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