Platform Companies and Platform Workers: Price and Quantity Responses to Changing Cost

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Abstract

What is a platform company and how are platform workers different from ordinary employees? If higher costs emerge for hiring platform workers, how will that impact consumer prices and platform workers? This note proposes a number of possible quantitative analysis for those responses. Using a range of assumptions, this note analyzes claims on price pass-through. The note concludes that under typical circumstances, predicted price responses are relatively minor. If price responses turn out to be large, that also reveals the extent to which platform companies are exercising market power, failing to innovate, and, by implication, marking up prices unnecessarily.

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1 Introduction

The rising visibility of the gig economy has made ever more prominent the precariousness of platform workers' economic position. Policy makers worldwide have sought to put in place policies that better protect those workers. All such policies have had to navigate the delicate tradeoff between

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maintaining the flexibility of platform work—a defining feature of the gig economy— while seeking to maintain sustainability and financial viability.

But what is a platform company and how are platform workers different from ordinary employees? If higher costs emerge for platform workers—from policy that improves housing and retirement adequacy, strengthens financial protection againt workplace injury, and enhances representation—how will that impact consumer prices and the quantity of platform workers working? What are the challenges faced by platform companies and platform workers due to these higher costs?

The remainder of this section describes platform companies and platform workers, and considers the challenges that both companies and workers face from policies that seek to improve platform workers' long-term financial positions. Subsequent sections consider a range of assumptions under which the price and quantity impact of such policies can be analysed.

A **platform** is a matching mechanism that brings together two distinct sets of economic agents: first, a group of consumers; and second, a group of producers such as food merchants, retail shopping outlets, car drivers, and so on.[1] Customers want what producers provide but for different reasons, in the very short run, the matching between demand and supply is hypothesized to be imperfect. The gig economy is the collection of organizational and market structures that serve to reduce the imperfectness in this matching of demand and supply.

Online information networks and digital devices provide the base technologies to improve matching. A platform, therefore, can be as rudimentary as an ordinary webpage that provides nothing more than producer rapid-contact information through email or smartphone apps. Or, a platform can be intricately elaborate with multiple add-on functions. Any platform, however, faces frictions in its matching process in that left to themselves, a consumer might only gradually over time find the producer that best provides what that consumer wants. Conversely, a producer need not instantaneously attract all the consumers that producer can optimally serve. While these frictions can be overcome in the longer-term, there is a real-

[1]Two groups being brought together in this way gives rise to the terminology of a "two-sided market", as in, e.g., Rysman (2009). However, as will be seen in the discussion to follow, what matters for the analysis in this paper is not this two-sidedness, but how platform workers—yet to be introduced in this discussion—come into the model.

time market need to improve matching process efficiency.

A **platform company** (or **platform operator**) is the agent that runs the platform and seeks to provide that greater efficiency. A platform company typically controls which producers list on the platform's supply side but leaves unrestricted the demand side. Every potential consumer, with the appropriate app on their smartphone or knowledge of the platform's URL, can freely sign on to the platform. To improve the platform's real-time matching efficiency, the platform company puts together a computer network and a suite of matching and scheduling algorithms, and employs teams of managers, data scientists, and software engineers. Finally, for the final step in the matching process, the platform company contracts **platform workers** specifically to deliver product physically from producers to consumers.

Food delivery provides a good example of these workings. On the producer side are businesses such as McDonalds, Jinjja Chicken, and the neighborhood nasi-lemak stall. Platform companies such as Grab, Go-Jek, Food Panda, or Deliveroo stand ready to connect consumers with those producers. Within each platform company, managers, software engineers, algorithms, and computer networks run in the background to improve the efficiency of the matching process. Platform workers provide the last link in the chain by physically delivering the prepared food from producer to end consumer.

Fig. 1 provides a visual depiction of the platform company operations just described.

The Figure shows in the dashed line directly connecting the two sides of the marketplace an engagement that is friction-distorted. The superior technology put in place by the platform company allows, instead, a connection that is closer to friction-free, as indicated by the dark lines connecting the company to both producers and consumers respectively.

In this description, platform workers are distinct from the managers, data scientists, software engineers, and others employed by the platform company. The latter are employees and therefore, depending on laws in different national economies, attract protection, benefits, and rights to varying degree. Worldwide, however, as a general rule platform workers are not considered employees. This distinction is useful in that it allows platform companies and platform workers considerable short-run flexibility in their contractual obligations.

National regulations on platform workers differ in details but continue

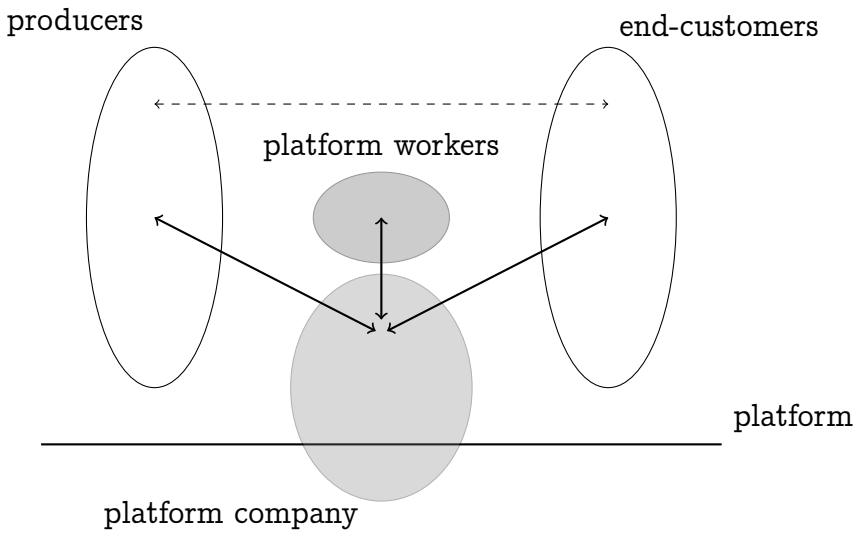

Figure 1: In a gig economy platform companies connect supply and demand, using computer networks, algorithms, and platform workers.

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to change. European Union legislation has recently reclassified platform workers as employees, thereby allowing equal access to employee rights and benefits. In China, platform workers have now been allowed to join unions, and platform companies are required to ensure adequate financial protection against workplace injury. In Singapore, employees are covered by the Employment Act; platform workers, however, are not. Flexibility is acknowledged to continue to be important. At the same time, however, to ensure comparable well-being over the longer term, policies on platform workers are being considered for their housing and retirement adequacy, financial protection against workplace injury, and improved representation. All these can be interpreted to raise the cost of contracting platform workers but without restricting flexibility.

An important special case of the discussion arises when the producer side of the market comprises not separate producers but just platform workers themselves (Fig. 2).

This arises when the market is for, say, the kinds of ride-hailing services provided by Grab, Go-Jek, Uber, and others. Then the producer is of course the platform worker, and no separate product is being provided.

Comparison between the two cases, Figs. 1 and 2, is sometimes used to

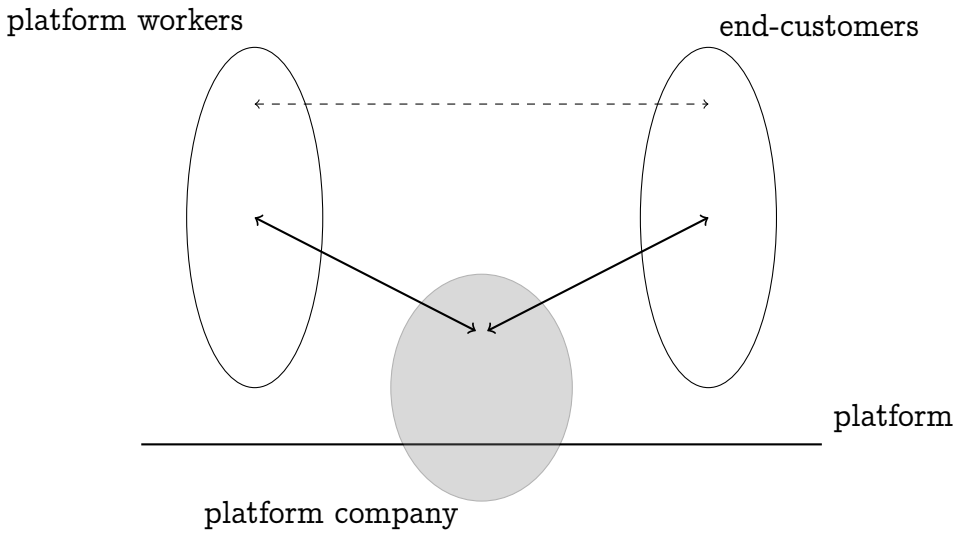

Figure 2: In a gig economy platform companies connect supply and demand, even when the suppliers are just platform workers themselves.

argue that platform workers are not contracted to work for the platform company but should be viewed as independent partners, the way that, say, a food merchant does not work for the platform company. This misses the critical point: In Fig. 1 a food merchant is uniquely identified in the views of consumers. Food from McDonalds is not the same as nasi-lemak from a neighborhood stall. The two orders are not perfect substitutes. In contrast, when a consumer hails for ride services in Fig. 2 or looks forward to the delivery of their nasi-lemak in Fig. 1, the platform worker bears no unique identification in the eyes of the consumer. Platform workers are perfect substitutes in a way that McDonalds and nasi-lemak are not. Thus, the platform company exercises control over the allocation of jobs, incentives, and payment over platform workers in ways that it is unable to over its food merchant partners. The analysis of this paper concerning platform workers is unchanged across Figs. 1 and 2: platform workers remain platform workers. They don't become independent partners to the platform company simply because in Fig. 2 platform workers appear to occupy a position similar to food merchants and shopping retail outlets in Fig. 1.[2]

[2]There is a third variant of platform company operation, and that is where platform workers vanish altogether from the mix. An example of this is when Grab arranges for

I turn now to the challenges that platform companies and platform workers face due to changes in legislation on housing and retirement adequacy, financial protection against workplace injury, and enhanced representation. Certain challenges are not unique to plaform workers, and so I do not treat them here. Examples include questions on how saving for housing and retirement reduces take-home pay and liquidity (even with additional contribution by employers and contracting companies, as in Singapore's Central Provident Fund); or that enhanced representation might lead to unnecessary and inappropriate processing activity at the same time that they might lead to more stable labour relations over the longer run (as in Singapore's tripartite system); and so on. The considerations on these are not special to platform workers, and are best treated separately. Yet other challenges include those of appropriate payment for financial protection when multi-homing can make unclear when a platform worker is working for which platform. This is a technical issue for insurance and platform companies to work through and price appropriately. I do not treat such problems in this paper. I focus here instead on the effects of policy changes that result in increasing the short-run cost of contracting platform workers.

A suggestion implicit in many engagements with platform companies is that a change in operator costs due to, say, CPF contributions will induce a 1-1, equiproportional rise in consumer prices. This sometimes goes under a 'pass-through' phrasing: "Any change in costs will see direct pass-through to customers."

The reasoning for this pass-through effect draws on observations such as "For every ten dollars in additional revenue we receive, nine goes to our drivers." The listener is invited to infer from this that labour cost is a high fraction of total operating costs, and so a 17 percent rise, say, in labour costs would mean total operating costs rising by nearly 17 percent and needing to be passed on in approximately the same proportional hike in prices.

A further implication often suggested is that such a price rise would result in significant reduction in use of platform services, thus lowering consumer well-being and risking industry sustainability. This additional

the consumer to take delivery themselves of the food they have purchased. In this case, producers use the platform company only as a booking and a payment-collection mechanism, and no platform workers are at all required. Because this paper is concerned about platform workers, this third case is ignored hereafter.

suggestion relies on observations about a high price elasticity of demand: so, for instance, an elasticity of magnitude 1.4 would imply that a price increase of 1 percent would reduce consumer demand by 1.4 percent. If this were literally true then platform companies are indeed caught in an unpleasant predicament: they face rising costs but when they attempt to pass through increased costs to higher prices, that only results in falling revenue.

In sum, given this reasoning, any attempt to raise platform-operator CPF contribution would risk industry sustainability, through raised labour costs, increased prices, and so much reduced demand that platform operator income can only decline.

There might well exist a set of logical reasoning that warrants this concern. But, in my view, the explanation given above remains inadequate. Platform companies still need to explain the circumstances under which these fears are realized. In contrast, the remainder of this note describes why the scenario just described is in fact unlikely.

In the sequel I use only two assumptions: first, there is a production function for generating platform services, drawing on labour input and the capital stock, where the latter can include machines, computers, networks, and algorithms. Second, there is a well-defined demand curve for platform services. On the other hand, it is not critical in the current discussion that these platforms operate in a two-sided market (Rysman, 2009).

Section 2 shows that if the output market is competitive and profits are small or close to zero then how much a firm will wish to raise prices is never more than how much wages increase. Indeed, in proportional terms the individual firm's desired price increase is far smaller than the increase in wages. For the market, if the demand curve is elastic, then in equilibrium the price increase will be smaller than the change in output. In other words consumers will see only small price inflation relative to other changes in the marketplace. If, conversely, the demand curve is inelastic, then however much the price rises, the change in market takeup will be even smaller in relative terms. Disruption to the market will be small.

Section 3 considers a situation different from Section 2. Here, suppose the market is monopolistic or oligopolistic, so that each firm can exercise market power. Then price is set as a markup over cost, and so in principle the increase in price could be considerable, depending on the price elasticity of demand. The greater the market power of the firm, the higher is

the markup. Section 3 shows that the more prices increase in response to a rise in wage, the more the firm is revealed to exercise monopoly power. Moreover, the section shows that the price increase is moderated, the more that technological innovation occurs that raises the marginal product of labour. Technologically-intensive firms can, therefore, keep price rises in check through technological creativity that makes workers more productive.

2 Small Profits when Close to Perfect Competition

Simultaneous with the assertions above, profit margins are often said to be either zero or extremely small, and that competition is rife. I, therefore, begin the analysis under these provisional assumptions.[3]

Suppose the profit margin is indeed zero. If so, then total revenue must equal the sum of labour costs and implicit interest payment on capital outlay, i.e.,

$$pq = wN + rK,$$

where p is price, q is quantity, w is per unit labour cost (or effective wage) of platform workers, N is quantity of labour input in platform workers, r is the capital rental (or interest rate), and K is quantity of capital input. In this analysis the computer networks, software algorithms, and teams of managers, data scientists, software engineers, and others employed by the platform company are usefully put into K. All these have a degree of permanence and inflexibility in their contractual obligations with the platform company, and thus are akin to fixed capital. In contrast platform workers, with high flexibility in raising or lowering their labour input, are better included in N.

Changes in factor prices Δw and Δr induce change in output price Δp satisfying:

$$\frac{\Delta p}{p} = \frac{\Delta w}{w}\left(\frac{wN}{pq}\right) + \frac{\Delta r}{r}\left(\frac{rK}{pq}\right),$$

[3] In line with this paper's concerns I focus on short-run market predictions. For increasing costs arising in particular from Singapore's Central Provide Fund (CPF) contributions in particular, Hoon (1991) provides a steady-state general equilibrium analysis. Both Hoon (1991) and Kim et al. (2022) suggest the welfare consequences are small for the kinds of CPF arrangements I will consider.

i.e., the proportional change in output price equals the weighted sum of proportional changes in factor prices, with weights given by the respective factor income shares.

In words, when profit margins are zero or small, the proportional change in output price is not a 100% passthrough. Instead, if one factor price changes, then the effect on output price is that factor price's proportional change multiplied by the factor share of total revenue.

In particular, in response to a change in labour cost, holding all else constant, the proportional change in output price is just:

$$\frac{\Delta p}{p} = \frac{\Delta w}{w}\left(\frac{wN}{pq}\right).$$

Labour's income share wN/pq, between 0 and 1, is the critical multiplier for how unit labour cost changes (such as CPF contributions) propagate to the final output price.

In aggregate national income accounting, labour's income share wn/pq is about one third, with capital's share the remaining approximate two thirds. In labour-intensive industries, the income share accruing to labour might be as high as 60%; correspondingly, in capital-intensive industries, labour's income share will be lower, perhaps only 20%. The platform industries PWAC considers are capital-intensive: algorithms, computers, and digital networks matter critically, while the labour input is relatively low-skilled. Thus, for these industries labour's income share is likely less than one-third. Using as an upper bound 30% for labour's income share, a change of, say, 17% of labour payments from full CPF contribution would amount to just over 5% in consumer price increase. An annual step change of 2 percentage points in additional CPF contribution would imply yearly increase of only 0.6% in consumer price.

The predicted price changes are, therefore, small, and far from a one-for-one proportional pass-through.

The key assumption that drives this conclusion is that profit margins are thin or zero. No hypothesis on the price elasticity of demand is invoked. But how would particular values for demand elasticity affect our analysis? In a competitive market with equilibrium price and output determined by demand and supply, fluctuation in the supply curve results in movement of prices and output along a given demand curve. If demand is elastic then, all else equal, a contraction in the supply schedule—a leftward shift in

the supply curve, say, because of imposing increased CPF contribution on platform operators—will generate a relatively small increase in price and relatively large reduction in output. In other words, the flow of services provided by the market and thus the quantity of platform work will fall; but consumers will see only relatively small price inflation. If, conversely, demand is inelastic, then the relative changes will be reversed in magnitude although not in sign. Price inflation will be relatively high but there will only be small impact on the market takeup of these platform services, and thus relatively small effect on platform work.

What happens, however, if profit margins are higher, i.e., if the market is characterized by monopoly or oligopoly? The note turns to that next.

3 Price as markup over costs, and the elasticity of demand

The most critical observation is that what happens to price in the market never follows mechanically from what happens to costs. Instead, determination of price is deliberate, and done in such a way as to benefit whoever gets to set that price. This is why understanding price elasticity of the demand curve, markup behaviour, and technical change matter for policy.

Except for very special cases, even for a given, fixed demand curve, the price elasticity of demand is not constant but will vary over the demand curve. In monopolistic and oligopolistic markets, suppliers operate in a region where demand is elastic, i.e., the price elasticity of demand exceeds one in absolute value.

When suppliers have market power, they set price as a markup over marginal cost, where the markup varies inversely with the magnitude of the price elasticity of demand. If markets become more and more competitive, that price elasticity for a given supplier grows in absolute value without bound—a small change in price induces ever larger response—so that the markup then converges eventually to zero. The higher is the price elasticity in magnitude, the lower is the markup.

No supplier with market power chooses to operate where the price elasticity is low in absolute value, i.e., where the demand curve is inelastic. In such a situation, the supplier can raise price and lower the quantity supplied—thus reducing operating costs—and in the process raise total revenue, thus increasing profits.

Suppliers with market power therefore set price as follows:

$$p = \frac{1}{1 + \epsilon^{-1}} MC,$$

where ϵ is the price elasticity of demand and MC is the marginal cost of production. To make progress we need some idea of what MC marginal cost is.

Write output according to the production function

$$q = F(N, K).$$

Total cost equals the sum of labour and capital costs, and so

$$C = wN + rK,$$

paralleling the price equation from earlier. In the short run, if capital is fixed, marginal cost is:

$$\frac{\partial C}{\partial q} = w \left(\frac{\partial q}{\partial N} \right)^{-1} = w F_N^{-1},$$

where $F_N = \partial F / \partial N$ is the marginal product of labour.

However, if, as is likely in these new platform industries, capital can also be adjusted in the short run, then marginal cost is further reduced, so in practice marginal cost is bounded from above by wF_N^{-1}. Using this as the upper bound in the price markup equation then gives:

$$p \leqslant \left(\frac{1}{1 + \epsilon^{-1}} \right) F_N^{-1} \times w.$$

The price impact of any change in labour input costs is therefore bounded from above by the product of the markup multiplier together with the change in unit labour cost. The total price-impact multiplier upper bound is

$$M \stackrel{\text{def}}{=} \frac{1}{1 + \epsilon^{-1}} \times F_N^{-1}. \tag{1}$$

This key multiplier M in (1) combines considerations from both market demand side (through the elasticity ϵ) and operator supply side (through labour productivity F_N). In other words, the price impact depends on both sides of the market: The larger is ϵ algebraically, the greater is the operator's market power, the higher is M; the more efficient and technologically

innovative is the operator, the higher is labour productivity, and so the lower is F_N^{-1}, and thus the smaller is M.

An increase in worker cost can, in this analysis, motivate platform companies to innovate and raise productivity. To take a concrete example, all else equal, platform algorithms can be finetuned to prioritise fastest delivery or, if worker costs rise, can instead bunch deliveries with only marginal reduction in delivery speed. In a gig economy that emphasises bragging rights in ever-faster deliveries, algorithms will de-prioritise clustered delivery and thus end up lowering worker productivity. Such inefficiency arises because of the "winner-take-all" or "economics of superstars" nature to competition when coming in first or rank ordering count inordinately highly (Dasgupta, 1988; Rosen, 1981). The competitor who comes in first wins all, and thereby inflicts a negative externality on everyone else in the race. That externality befalls even those who just narrowly missed winning but ended up producing nearly as much and as successfully as the first-place winner. This distorts incentives: too much effort is put into coming first, while those who have done good work are not rewarded. Winner-take-all competition in the gig economy produces outcomes that are socially inefficent.

A slight increase in worker cost can shift the tradeoff to instead emphasise allowing a single trip by a platform worker to effect multiple deliveries. By leveraging on historical delivery patterns and scheduling payload in more efficient clusters, labour productivity can be increased, thus lowering its reciprocal F_N^{-1} and the price multiplier M, the price markup multiplier.[4]

Without such technological improvement, however, in equation 1 multiplier M, admittedly, could be large. If, say, $\epsilon = -1.4$ then $1/(1+\epsilon^{-1})$ is 3.5. If further F_N equalled 1, the proportional price change would then be three and a half times the change in unit labour cost.

However, (a) if platform operators are able to adjust their capital input, then the multiplier component F_N^{-1} would be reduced from any initial given value; (b) technological and digital innovation work to raise labour

[4]To be clear, the causality here is from cost to productivity to price reduction. There are other proposals that seek an increased market price to then shift surplus from consumers to platform workers (e.g., Agarwal and Chua, 2022). From a macro aggregate perspective, such proposals do nothing to raise productivity and well-being. They simply redistribute surplus from consumers to platform companies and workers, making some better off and others worse off. What the text describes instead is a way to raise productivity, thus improving the well-being of everyone in society.

productivity, so that F_N^{-1} and therefore multiplier M would be reduced; and (c) the higher is the price elasticity of demand, i.e., the more competitive are markets, the lower will be multiplier M. In other words, that the price impact is large reflects the degree of market power the platform operators exercise and how unwilling operators are to innovate. If the platform operators truly were able to exercise only minimal market power and innovated to raise labour productivity, then so too would the price impact be relatively minor.

4 Conclusion

This note has set down definitions of platform companies and platform workers, and described circumstances under which platform operator price changes vary in response to an increase in labour costs. If, as platform companies insist, they are operating on thin or zero margins, the predicted output price response is minimal, as little as just one third of the proportional increase in labour cost. This is independent of the elasticity of the demand curve, although that last does matter for whether the equilibrium change is larger in price or quantity.

If, conversely, platform operators behave monopolistically or oligopolistically and margins are sufficiently high, then a different reasoning applies. However, the conclusion remains similar in spirit. If platform operators don't have overwhelming market power and if they innovate to raise productivity, so too will the resulting price impact be small.

References

Sumit Agarwal and Yeow-Hwee Chua. Ending cheap convenient deliveries will help platform workers in Singapore. *CNA*, Mar 2022. https://www.channelnewsasia.com/commentary/end-cheap-convenient-deliveries-help-platform-gig-workers-increase-productivity-more-pay-2578921.

Partha Dasgupta. Patents, priority and imitation or, the economics of races and waiting games. *Economic Journal*, 98:66–80, 3 1988.

Hian-Teck Hoon. The long-run general equilibrium consequences of choos-

ing the CPF contribution rate in the Singapore economy. *Singapore Economic Review*, 36(1):70–80, Apr 1991.

Jinyoung Kim, Seonghoon Kim, and Kanghyock Koh. Labour market institutions and the incidence of payroll taxation. *Journal of Public Economics*, 209:1–18, May 2022. doi: 10.1016/j.jpubeco.2022.104646.

Sherwin Rosen. The economics of superstars. *American Economic Review*, 71:845–858, Dec 1981.

Marc Rysman. The economics of two-sided markets. *Journal of Economic Perspectives*, 23(3):125–143, Summer 2009.