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Maxime Agbo

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The Multi-Level Marketing As a Two-sided Market *

Maxime Agbo†1, 2

1 Ecole Nationale de Statistique, de Planification et de Démographie (ENSPD), Université de Parakou
2 Laboratoire de Recherche en Sciences de la Population et du Développement (LaReSPD), Université de Parakou

Abstract

The Multi-level marketing (MLM) can be identified as a two-sided market a la Rochet and Tirole (Rochet and Tirole, 2003, 2006; Weyl, 2010). The platform is represented by the promoter of the MLM and the sides are the recruitment activity and the selling activity. The recruitment side has negative network effect on the selling side, and the selling side generates positive network effect in favour of the recruitment side. We compare the social planner’s solution with that of the profit-maximizer. We find that, like the newspapers and credit cards two-sided markets studied in Weyl (2010), the MLM business is characterized by some distortions. First, there is a distortion coming from the negative network effect from the recruitment side. The selling side is not a source of distortion or the profit-maximizer can internalize it. Second, there is another distortion due to the

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†ENSPD, University of Parakou, Benin. Email: agbomaxime@gmail.com, Address: BP 1009 Parakou, Benin. Phone: +229 97 13 61 82.
signal the promoter uses to increase artificially the valuation of
the business and the product. However, this distortion can be
mitigated by the recruitment side effect. Also, contrary to the
newspapers two-sided market, there is no Spence distortion on
the MLM two-sided market.

**Keywords:** Multi-level marketing, two-sided market, recruitment side,
selling side.

**JEL Classifications:** L22; D21; D40

**Résumé**

De plus en plus très répandu en Afrique, le marketing multi-niveaux
(MLM) est une technique de marketing qui consiste à vendre un pro-
duit par le biais de distributeurs qui ont la possibilité de vendre le pro-
duit et de recruter d’autres distributeurs pour la compagnie. Chaque
distributeur gagne un revenu sur sa propre vente, mais aussi sur la
vente des distributeurs qu’il a recrutés. Dans cet article, nous avons
analysé le MLM comme un marché à deux côtés, étudié par Rochet et
Tirole (Rochet et Tirole, 2003, 2006; Weyl, 2010). La plate-forme est
la compagnie, et les deux côtés sont le recrutement et la vente. Le re-
crutement induit une externalité négative sur la vente et la vente a une
externalité positive sur le recrutement. Nous avons comparé la solution
du planificateur social à celle de l’entreprise. Nos analyses montrent
que, à l’instar des marchés à deux côtés des cartes de crédit de Weyl
(2010), le MLM est caractérisé par des distorsions. D’abord, il existe
une distorsion provenant de l’externalité négative du recrutement. En-
suite, nous avons une deuxième distorsion issue de la vente, mais qui
peut facilement être internalisée par la compagnie. Enfin, il y a une
distorsion provenant du signal que la compagnie émet pour augmenter
artificiellement la valuation du produit. Par ailleurs, contrairement au
marché des cartes de crédit, le MLM ne présente pas de distorsion de
Spence.
Introduction

The Multi-level marketing (MLM) refers to a marketing method organized by or under the auspices of a company, and in which the distributor of the product makes money not just from his own sales, but also by getting commissions from the sales made by the other distributors he had recruited (sponsored) into the MLM organization. The distributor purchases the product from the MLM company and sells it to the end-consumers at a retail price set by himself. From that definition, the Multi-level marketing turns out to be a marketing strategy in which a business promoter sells his product through two types of agents: sellers and recruiters. The recruiter gets a commission (from the promoter) on the sales made by the sellers he had recruited into the MLM. The seller gets a commission (from the promoter) on his sales, in addition to the retail price he sets when selling the product. However, the sellers suffer from the actions taken by the recruiters who recruit people who might be competitors for them. In other words, more there are sellers more the recruiters enjoy the business, and more there are recruiters less the sellers enjoy it. Therefore, the Multi-level marketing business turns out to be a two-sided market. So, in this paper, the goal is to study the multi-level marketing as a two-sided market.

Indeed, the concept of multi-sided market remains ambiguous (?). Most of the time the authors define multi-sided market using typical and canonical examples. However, in general, a multi-sided market is one in which an operator (platform) acts as an intermediary between two or more groups (sides) of agents (users) and where there is externality through which the members of one group get benefit or damage from the members of the other groups. The common examples for these markets are the markets of credit cards (MasterCard acts as intermediary between consumers and merchants), newspapers (New York Times is an intermediary between readers and advertisers). In this paper, we adopt the concept as viewed by ?, ?, ? or ?. Precisely, most of the

1? even states that "virtually all markets might be two-sided to some extent".
2See ?, ?, ?, ? for other examples of two-sided markets.
multi-sided markets share the following characteristics.

1. The platform acts as an intermediary by proposing to each side a specific service, product or opportunity. It may propose different services to the sides. As such, multi-sided platform can be seen as a multi-product firm. The services can be given from the platform to the sides or from the sides to the platform.

2. There is network effect through which the benefit or damage that the members of one side are provided with is affected by the numbers of users on the other sides. There is cross network effect in the words of ?. It may also exist network effect inside the sides.

3. The platform sets different prices (or treatments, rewards) for all sides in compensation of the service provided. The network effect raised should not directly depend on the prices.

The network effect concept raised in the second point is the network effect as pioneered by ? or ?. It could also be a competition effect (?) or a pecuniary externality (?). If the effect is positive the users will express less interest in being members of one side if there is no agent willing to be member of the other sides. Similarly, if the network effect is negative then nobody is interested to be member of one side if there is high number of agents on the other sides. Moreover, according to the last point characterizing the multi-sided market, and in line with the first point, the compensation (price) of the intermediary is not necessary a cost borne by the members on the different sides, but can also be a reward benefiting them.

To some extent, the multi-level marketing conforms with the three features above. The MLM company promoter, through the products (or services, opportunities) he is marketing, proposes two different kinds of activity to the customers: Recruitment and selling. Those who decide to recruit are said to be on the recruitment side and those who decide to sell are on the selling side. There is no doubt that the more there are sellers the more it is interesting to be recruiter. Moreover, the more there are recruiters, the more the recruitment side is
harmful for the sellers because competition is likely to be higher on the selling side. Thus the two-sided market induced by the MLMs is similar to the newspapers’ two-sided market. However, some specific possible concerns could be raised about the two-sidedness of the MLMs.

First, some may think that the positive network effect that the recruiters enjoy from the sellers is questionable, in that, for a given recruiter not all the sellers provide him network effect but those who are in his downline. This reality is not specific to the MLMs. A given merchant will not get network benefit from all the consumers who are holding visa card, but from those who are inclined to make transaction with him. This aspect of the problem is not necessary of less importance. However, since the literature (on multi-sided platforms) ignores it we then simplify our framework by ignoring it. Second, contrary to Visa, Newspapers or dating platforms, apparently there is no direct interaction between recruiters and sellers. However, such an interaction exists, even though indirectly, and is led through the MLM’s product and the customers that both recruiters and sellers are targeting. Since recruiters and sellers are competing for the same group of customers, they influence each other. In the spirit of ?, the customers group could be considered as another side of the market, making the MLM a three-sided platform. However, we cannot do this way because, here, the promoter (platform) sets no price for the customers. The third concern about the MLM is that the same user can be on the two sides at the same time. The seller can be recruiter as well, and vice versa. However, this is also true for other two-sided markets. An example is the famous platform Kijiji where the same individual could be buyer and seller. Nevertheless, even though some could consider this reality in MLM does not conform with the three features that characterize the multi-sided markets, we can overcome the problem. We will consider as members of a given side the time allocated to the activity relevant to that side. The members of the recruitment (selling) side are repre-

\[ ^3 \text{In fact, we should recognize that the Multi-level marketing is more than a two-sided market, but for now we are just interesting in what that will be useful to answer our main question in this paper.} \]
sented by the total amount of time allocated to recruitment (selling) activity. This will not affect our results since in the classical literature (on multi-sided market) the users are assumed to be a continuum on each side (see ?, or ?).

As we mention above, we study the two-sided market of the Multi-level marketing. The platform is the promoter of the business. He decides on the commission to pay to the sellers and the compensation for the recruiters. He also decides on the amount of signal to use to increase the valuation of the product. The recruiters get benefit from the sellers’ action because the recruitment compensation is dependent on the amount of sales made by the sellers. The presence of recruiters is potentially harmful for the sellers because of their actions consisting in enrolling other people who might compete with them on the selling side. Precisely, an intensification of activities on the recruitment side leads to a decrease of the retail price set by the sellers. For each side we consider as number of users the total time spent by people doing activities on that side. In other words, the number of users on the recruitment side is the total time used by MLM members to recruit, and the number of users on the selling is the total time used to sell the product to end-consumers. We compare the social planner decision with that of the profit-maximizer (promoter). We find that the MLM is characterized by distortions, as we can see for most of the two-sided markets. Specifically, there are two types of distortion. The first distortion is generated by the cross network effect between the two sides of the market. This cross network effect distortion comes mainly from the recruitment side. The positive network effect from the selling side is not a severe cause of distortion, or could be solved easily by the profit-maximizer. Therefore, the multi-level marketing is a kind of two-sided market where the distortion comes mainly from one side. The second distortion comes from the signal the promoter uses to increase the valuation of the business and the product. Because this signal leads to an artificial increase in the valuation of the business,

\footnote{ would prefer the use of the term \textit{two-sided strategies}.}
and does not add any market value to the product, it leads to market imperfection. However, the good news is that the negative network effect from the recruitment side can help mitigate that signal distortion. This is another particularity of the MLM where one type of distortion mitigates the other type of distortion.

The rest of the paper is organized as follows. We present the model in Section 1. Then, we characterize in Section 2 the social planner’s solution which we compare with the profit-maximizer in Section 3. Section 4 presents some concluding remarks.

1 The model

The multi-level market as a two-sided market is a game involving three players: the promoter, the sellers and the recruiters.\textsuperscript{5} We present in this section each of these players.

1.1 The promoter

The promoter chooses the wholesale price $c$ at which the sellers purchase the product. He also decides on the commission $A$ paid to the sellers per unit of sales made by them, and the compensation $B$ paid to the recruiters per unit of sales made by their downline. Moreover, as in Agbo (2015), the promoter tries to increase the consumers’ valuation of the product by giving a signal $v$ and bears a cost $K(v) = v$. The signal does not only concern the commodity, but is also related to any action designed to promote the whole business of recruitment and selling. For instance, every so often, the MLMs promoters train their representatives in the \textit{in-person presentation} of the products and how to use them. The goal is to improve the quality of the service given by the distributors. Another example is any kind of motivation (holidays trip, guided tour, study trip, etc...) the promoters give to distributors.

\textsuperscript{5}We do not consider the consumers group because they do not matter for the present analysis. They are not included in the two-sided market we study and the promoter (platform) does not act directly with them.
to incite them to be interested in the product consumption. It also include some relationship marketing practices like infomercials, magazine, etc. (?????). We denote by $Q$ the total quantity sold by the promoter whose payoff is

$$\pi_{MLM} = (c - m - A - B)Q - K(v)$$  \hfill (1)

where $m$ is the unit production cost. From Agbo (2015), $Q$ depends on the total time $t$ the recruiters allocate to recruitment activity and the total time $\tau$ the sellers allocate to selling activity.

### 1.2 The recruiters

The recruiters decide on the total time $t$ to allocate to the recruitment activity. They get $BQ$.

### 1.3 The sellers

The sellers make decision about the total time $\tau$ to allocate to the selling activity, and the price $p$ at which they sell the product. We assume that the price $p$ is function of the total recruitment time $t$, with $\frac{\partial p}{\partial t} < 0$. The sellers purchase the product at a unit cost $c$ set by the promoter. The total profit derived by the sellers is

$$U_s = U_s(\tau, p, \cdot) = (p + A - c)Q.$$  \hfill (2)

The recruitment side harms the selling side. Therefore, we assume that $\frac{\partial p}{\partial t}$ is negative enough to make negative the derivative of the sellers' profit, i.e.,

$$\frac{\partial U_s}{\partial t} = p \frac{\partial Q}{\partial t} + \frac{\partial p}{\partial t}Q + (A - c)\frac{\partial Q}{\partial t} < 0.$$

The game is as follows. First, the promoter decides on the wholesale price $c$, the signal $v$, and the compensations $A$ and $B$. Then, the sellers decide on the selling time $\tau$, and the recruiters decide on the
recruitment time \( t \). However, in this paper, because we are studying the two-sided platform of MLM, we focus on the decisions made by the promoter. Nevertheless, we assume that \( p + A - c > 0 \) because the sellers will not accept negative profit. The decision variables are therefore \( A, B, c \) and \( v \). The total quantity \( Q \) depends on \( t \) and \( \tau \). We assume that \( Q \) is increasing in \( \tau \). In turn \( t \) and \( \tau \) depends on \( A, B, c \) and \( v \). Therefore, the quantity sold \( Q \) is a function of \( A, B, c \) and \( v \).

Before going to the next section, let us make the following reasonable assumptions.

**Assumption 1.1.**

\[
\frac{\partial t}{\partial A} < 0; \quad \frac{\partial \tau}{\partial A} > 0; \quad \frac{\partial t}{\partial B} > 0; \quad \frac{\partial \tau}{\partial B} < 0; \quad \frac{\partial t}{\partial c} > 0; \quad \frac{\partial \tau}{\partial c} < 0; \quad \frac{\partial t}{\partial v} > 0; \quad \frac{\partial \tau}{\partial v} > 0. \quad (4)
\]

These assumptions above are realistic. If the company increases the commissions on sales, distributors will be incited to devote more time to selling and probably less time to recruitment. The opposite is true for an increase of commissions on recruitment. Moreover, the wholesale price has negative effect on the capacity to purchase and sell the product, and then on \( \tau \). For the signal \( v \), its purpose is to encourage people to get engaged in the MLM activity. Thus \( v \) is likely to impact positively both recruitment and selling. Concerning the effect of the wholesale price on the recruitment time, if the product is expensive it is likely to encourage people to recruit.

### 2 Social utility maximizing decision

In this section we study the decisions the social planner would take. Decisions concern the compensation plan \( A \) on the selling side, the commissions \( B \) for the recruitment side, the wholesale price \( c \) and the signal \( v \). The social planner maximizes the total payoff of all the actors engaged in the business. That total payoff is

\[
V = (c - m - A - B) Q - K(v) + BQ + U_s(\tau, p, .) \quad (5)
\]
$U_s(\tau, p, .)$ includes $AQ$ and $cQ$ because it represents the payoff of the seller. Thus, the social utility becomes

$$V = -mQ - K(v) + \xi(.)$$

(6)

where $\xi(.) = U_s(\tau, p, .) - AQ + cQ = pQ$.

Observing equation (6) reveals that the only term that could make $V$ positive is $\xi(.)$. In other words, if there is no sufficient profitable sales, MLM cannot be socially profitable. This shows the importance of the selling side. The first-order conditions maximizing $V$ are

$$-m \frac{\partial Q}{\partial A} + \frac{\partial \xi}{\partial A} = 0$$

(7)

$$-m \frac{\partial Q}{\partial B} + \frac{\partial \xi}{\partial B} = 0$$

(8)

$$-m \frac{\partial Q}{\partial c} + \frac{\partial \xi}{\partial c} = 0$$

(9)

$$-m \frac{\partial Q}{\partial v} - \frac{\partial K}{\partial v} + \frac{\partial \xi}{\partial v} = 0$$

(10)

In the following proposition we give a characterization describing the social optimal decision.

**Proposition 2.1.** At the point where the social welfare is maximized we have

$$\frac{\partial Q}{\partial \tau} - \frac{\partial p}{\partial v} \frac{Q}{(p - m) \frac{\partial Q}{\partial \tau}} = \frac{\partial \tau}{\partial A} = \frac{\partial \tau}{\partial B} = \frac{\partial \tau}{\partial c} = \frac{\partial \tau}{\partial v} - \frac{1}{(p - m) \frac{\partial Q}{\partial v}} \left( \frac{1}{\frac{\partial v}{\partial \tau}} + \frac{\partial p}{\partial v} \frac{Q}{\partial \tau} \right)$$

*Cross network effect distortion*

*Signal distortion*

**Proof.** See Appendix A

From the social planner point of view, the necessary condition to maximize the social utility is that the effect of the different policies (on $A$, $B$, or $c$) on one side of the market relatively to the other side should be equal. This result is standard. We will analyze extensively this necessary condition in Section 3 by comparing it with the necessary condition of the profit-maximizer.
From Proposition 2.1 we can write that if social utility is maximized, \( \left| \frac{\partial \tau}{\partial A} \right| \) is an effect (benefit) of the sales commission rate \( A \) on the selling side and \( \left| \frac{\partial \tau}{\partial B} \right| \) is a cost (damage) of the recruitment commission \( B \) on the selling side. Similarly \( \left| \frac{\partial t}{\partial A} \right| \) and \( \left| \frac{\partial t}{\partial B} \right| \) are respectively a gain from \( B \) and a cost from \( A \) on the recruitment side. Thus, \( \left| \frac{\partial \tau}{\partial A} \right| \) and \( \left| \frac{\partial t}{\partial A} \right| \) are respectively the relative gain on selling side and relative cost on recruitment side induced by the sales commission rate \( A \). Therefore, we can say that, according to Proposition 2.1, the relative gain on the selling side should be equal to the relative cost on the recruitment side. This is a standard result when studying internalization of network effects or of any kind of externality. As we will see in Section 3 the profit maximizer does not necessary come to this condition. As a consequence, in case of deviation from the social welfare maximizer’s decision, the profit-maximizer can incite distributors to turn more or less to non optimal recruitment.

Another way to understand Proposition 2.1 is as follows. Since \( \left| \frac{\partial \tau}{\partial A} \right| = \left| \frac{\partial \tau}{\partial B} \right| \) we can say that at equilibrium the net gain from \( A \) is equal to the net cost from \( B \). Due to the network effect we identified before, we can assume that \( \left| \frac{\partial \tau}{\partial A} \right| > \left| \frac{\partial t}{\partial A} \right| \) (the sale commission rate is more profitable on the selling side than it is harmful on recruitment side). As consequence \( \left| \frac{\partial \tau}{\partial B} \right| > \left| \frac{\partial t}{\partial B} \right| \). Thus, to meet the condition in Proposition 2.1 the commissions rate should be chosen such that \( A > B \). If for instance the profit-maximizer chooses \( B > A \), it can
lead to over recruitment. We prove that

\[-m \frac{\partial Q}{\partial t} + \frac{\partial \xi}{\partial t} - m \frac{\partial Q}{\partial \tau} + \frac{\partial \xi}{\partial \tau}\]

\begin{equation}
\Downarrow \quad V a l u e \ of \ recruitment \ side
\end{equation}

where the first term of the equations can be interpreted as the value of recruitment side in comparison with the value of selling side. The social utility maximizer can choose the commissions such that

\[\frac{A}{B} = \left| \begin{array}{c}
\frac{\partial \tau}{\partial A} \\
\frac{\partial \tau}{\partial t} \\
\frac{\partial \tau}{\partial A}
\end{array} \right| = \left| \begin{array}{c}
\frac{\partial \tau}{\partial B} \\
\frac{\partial \tau}{\partial t} \\
\frac{\partial \tau}{\partial B}
\end{array} \right|,
\]

In a simpler model where the decision-makers are the sellers, Agbo (2015) found that the recruitment plan is beneficial for the company because it allows the company to sell more. It is worthy to check this result in a more complex setup when the decision maker is the social planner. Precisely, we intend to ask whether (under the planner’s view) the total quantity \(Q\) increases with \(t\) (the total time allocated to recruitment), and under which condition. Concerning an increase in \(\tau\) (the time allocated to selling), we can argue that it increases the total quantity sold by the promoter \((\frac{\partial Q}{\partial \tau} > 0)\). If sellers devote more time to selling, everything equal elsewhere, they will sell more and then the purchase from the company will increase. In contrast, concerning the sign of \(\frac{\partial Q}{\partial t}\), things are not so trivial for a simple reason. If \(t\) increases the number of people enrolled into the MLM will increase. Because the MLM members have to purchase and sell a minimal amount of product, the purchase from the company will increase, everything equal elsewhere. However at the same time, more recruitment deters selling incentive and then the purchasing incentive. Therefore, the effect

\[\text{\footnotesize This expression of } \frac{A}{B} \text{ is not derived from the social welfare maximizer program. It is just an intuitive insight.}\]
of recruitment time on the total quantity $Q$ seems ambiguous. However, the following proposition states that if the decision-maker is the planner, more recruitment allows the promoter to sell more.

**Proposition 2.2.** At the point where the social payoff is maximized, recruitment is favorable for the MLM promoter’s sales, i.e., $\frac{\partial Q}{\partial t} > 0$.

**Proof.** See Appendix B

Indeed, an increase in $t$ leads to a decrease in the price $p(t)$. Since we do not take into account the consumers’ demand, one could expect a decrease in sales, because a decrease in selling price would discourage the sellers. However, the social planner can internalize that negative effect of recruitment on price by choosing the compensation $A$ in order to encourage selling and purchases.

### 3 Profit-maximizing decision

The MLM promoter is concerned with the profit he maximizes by choosing optimally the wholesale price $c$, the signal $v$ and the commissions $A$ (on sales) and $B$ (on recruits’ sales). The profit to maximize is

$$\pi_{MLM} = (c - m - A - B)Q - K(v) \quad (13)$$

The first-order conditions maximizing the profit in (4) are

$$-Q + (c - m - A - B)\frac{\partial Q}{\partial A} = 0 \quad (14)$$

$$-Q + (c - m - A - B)\frac{\partial Q}{\partial B} = 0 \quad (15)$$

$$Q + (c - m - A - B)\frac{\partial Q}{\partial c} = 0 \quad (16)$$

$$(c - m - A - B)\frac{\partial Q}{\partial v} - \frac{\partial K}{\partial v} = 0 \quad (17)$$

Proposition 3.1 gives the necessary condition of the promoter’s profit maximization.
Proposition 3.1. At the point where the profit of the promoter is maximized we have

\[-\frac{\partial Q}{\partial t} = \frac{\partial \tau}{\partial A} - \frac{\partial \tau}{\partial B} \frac{\partial Q}{\partial t} \frac{\partial \tau}{\partial c} + \frac{\partial \tau}{\partial c} \frac{\partial Q}{\partial A} - Q \frac{\partial \tau}{\partial v} = \frac{\partial \tau}{\partial A} - \frac{\partial \tau}{\partial B} \frac{\partial Q}{\partial t} \frac{\partial \tau}{\partial c} + \frac{\partial \tau}{\partial c} \frac{\partial Q}{\partial A} - Q \frac{\partial \tau}{\partial v} \]

(18)

Proof. See Appendix C

One could see that the necessary condition of the profit-maximizer is different from that of the social planner. This difference stems from two facts. First, the cross network effect between the two sides is a source of distortion. Contrary to the profit-maximizer, the social planner internalizes this cross network effect in the term $-\frac{\partial p}{\partial t} Q (p - m)$ of Equation (11). $\frac{\partial p}{\partial t} Q$ represents the negative externality of the recruitment side on the selling side, and $\frac{\partial Q}{\partial \tau}$ represents the positive externality of the selling side on the recruitment side (the utility of the recruiter is $B Q$). Second, the signal introduced by the promoter to incite the MLM members is another source of distortion. To understand these two distortions, suppose that there is no signal and no negative cross network effect from the recruitment side (i.e., $\frac{\partial p}{\partial t} = 0$). We can see that the social planner necessary condition would imply the profit-maximizer condition. In other words, in absence of signal and recruitment externality it is possible to implement policies about $A; B$ and $c$ which meet both social planner and profit-maximizer conditions. A lesson from this result is that the positive cross network effect from the selling side is easy to solve. The reason is that the positive network effect of the selling side is induced through the total quantity $Q$. That total quantity also interests the promoter. Therefore, by maximizing the profit the promoter can internalize the effect if they is no recruitment network effect. Precisely, even though the network effect from the selling side generates market imperfection, that market imperfection can be solved. In other words, the distortion brought by the cross network effect between the two sides comes from the recruitment side. Therefore the MLM two-sided platform is the one for which the
market imperfection comes mainly from one side, the recruitment side. However, in presence of the recruitment network effect, the selling side network effect matters. Even, it could strengthen the recruitment network effect. We can see it with the term $-\frac{\partial p}{\partial t} Q (p-m) \frac{\partial Q}{\partial \tau}$ of Equation (11).

More the selling side brings positive externality on the recruitment side, more there will be recruitment, and more recruitment will be harmful for the selling side.

The distortion generated by the signal $v$ is represented by the right-hand term of the last equality in Expression (11). The signal leads the MLM members to increase their valuation of the business and the product, but does not add any market value to the product. It is a production cost that adds no value to the product. Therefore, the price $p(t)$ fails to include the real value of the product. There is then an imperfection of the market. Let us remark that this signal distortion is affected by $\frac{\partial p}{\partial t}$, the recruitment side network effect. Specifically, as we can see from Equation (11), the recruitment side network effect mitigates the distortion induced by the signal $v$. Indeed, the signal may increase artificially the price $p(t)$ which, in turn, is reduced by the recruitment time. In other words, the recruitment side creates a distortion but helps reduce the other distortion.

Contrary to the two-sided market of ?, in the MLM there is no Spence distortion because there is no members heterogeneity regarding the network effect from the other side (see ?). All the recruiters enjoy the selling side in the same way, and all the sellers are identically harmed by the recruitment side.

As we did for the social planner, we study below the effect of the recruitment time on the total quantity sold if the promoter is the decision-maker. Indeed, Proposition 3.2 gives an answer to the question of why some firms owners adopt the MLM. If decisions (about commissions and other decision variables) are made accordingly by the promoter, recruitment provides the company with an important selling tool. When the recruitment size increases, the number of people being engaged in the MLM activities rises and the opportunity to
sell is enhanced for the company. However, it is worthy to precise that recruitment is not always good for the company but at the point where the profit is maximized. Thus, if the managers do not make rationally their marketing policies, recruitment might be harmful.

As conclusion, whether the decision-maker on the platform is the social planner or the promoter, recruitment increases the total sales made by the MLM managers. This result unveils the importance of the recruitment which is the corner stone of the business.

**Proposition 3.2.** *At the point where the promoter maximizes his profit, recruitment is favorable for the company’s sales, i.e., \( \frac{\partial Q}{\partial t} > 0 \).*

**Proof.** We had

\[
- \frac{\partial Q}{\partial \tau} = \frac{\partial t}{\partial A} - \frac{\partial t}{\partial B} \frac{\partial Q}{\partial A} - \frac{\partial Q}{\partial B}
\]  

(19)

Under assumptions above and with (19), it turns out that \( \frac{\partial Q}{\partial t} / \frac{\partial Q}{\partial \tau} > 0 \), and then \( \frac{\partial Q}{\partial t} > 0 \) since \( \frac{\partial Q}{\partial \tau} > 0 \). \( \square \)

With the result in Proposition 3.2 we should ask if the distributors sell more or allocate more time to selling activity at equilibrium when recruitment time rises. Let \( \tau^* \) and \( t^* \) denote respectively the selling time and recruitment time which maximize the promoter’s profit. Thus, it exists \( Q^* \) such that \( Q(\tau^*, t^*) = Q^* \) at equilibrium. As a consequence, \(-\frac{\partial Q}{\partial t} / \frac{\partial Q}{\partial \tau}\) is an expression of the sensitivity of the selling time to the recruitment time. We know from (19) that \(-\frac{\partial Q}{\partial t} / \frac{\partial Q}{\partial \tau} < 0\). As a consequence, at the point where the promoter maximizes his profit, recruitment allows the whole company to get rid of the product while it deters the distributors’ incentive to devote more time to selling activity. We can learn two things from this result. First, recruitment increases the market share of the company because it gives recruiters sufficient *price leading power*\(^7\) in order to sell without devoting much time to selling activity. It means that people who recruit are those who

\(^7\)The price leading power is the capacity of an MLM members to charge competitive price \( p \), see Agbo (2015).
are able to sell, and they recruit for the purpose of getting the *price leading power*. In that case, the promoter’s policies incite distributors to recruit just for selling purpose. Second, recruitment could enhance the company’s market share because it increases the number of people involved in the MLM plan, and therefore the purchases amount from the company. People purchase from the company for personal consumption and there’s a chance that unsold inventory exists. In such a situation, people recruit just for the recruitment purpose.

If the promoter is willing to incite distributors to devote time to selling activity, he can use the commission on sales \(A\) or the wholesale price \(c\). The strategy would consist in increasing \(A\) while maintaining constant \(B\) or in decreasing \(c\). The question is which of these two policies (increasing \(A\) and decreasing \(c\)) incites more distributors to allocate their time to selling. According to Proposition 3.3 the result depends on how the commission \(A\) and the wholesale price \(c\) affect the recruitment side of the market.

**Proposition 3.3.** *If the decision-maker is the promoter (profit-maximizer) then* \(\text{sign} \left( |\frac{\partial \tau}{\partial A}| - |\frac{\partial \tau}{\partial c}| \right) = \text{sign} \left( |\frac{\partial t}{\partial A}| - |\frac{\partial t}{\partial c}| \right)\).

**Proof.** From Proposition 3.1 and Assumption 1.1 we have

\[
0 > \frac{\partial \tau}{\partial A} + \frac{\partial \tau}{\partial c} = \frac{\partial \tau}{\partial A} - \frac{\partial \tau}{\partial c} = \frac{|\partial \tau}{\partial A} - |\partial \tau}{\partial c}|\]  

(20)

If a decrease in commissions on sales \(A\) leads to more decrease in recruitment time than a decrease in the wholesale price \(c\) would do, then the best way to increase the selling time is to increase the commissions on sales. In opposite case the best way would be to decrease the wholesale price \(c\). This result is quite intuitive because a policy that can encourage selling is the one that can also discourage people from recruiting. The reason is that the recruitment side generates negative network effect on the selling side. Proposition 3.3 has another implication. Actually in the MLM business, the commission \(A\) is a discount on
sales and then a deferred reduction on the wholesale price. Concerning the decrease in \( c \), it is an immediate reduction on the wholesale price. Distributors would prefer an immediate reduction of cost to a deferred reduction. In other words, a decrease in wholesale price is more likely to encourage selling activity than an increase in commission on sales would do. As a consequence, in comparison with an increase in commission on sales \( A \), a wholesale price decrease is more likely to decrease the recruitment time. In conclusion, both on the selling side and on the recruitment side, decreasing the wholesale price and increasing the commission on sales are not equivalent policies.

It would be also interesting to discuss the way the signal \( v \) impacts the selling side. We had

\[
- \frac{\partial Q}{\partial t} = \frac{\partial \tau}{\partial A} \frac{\partial K}{\partial v} - \frac{\partial \tau}{\partial v} Q < 0.
\]

Under Assumption 1.1,

\[
\frac{\partial \tau}{\partial A} \frac{\partial K}{\partial v} > \frac{\partial \tau}{\partial v} Q.
\]

or

\[
\frac{\partial \tau}{\partial A} > \frac{\partial \tau}{\partial v} \quad Q > \quad (21)
\]

The left hand side of expression (21) can be interpreted as the benefit-cost ratio of an increase in the commission rate on sales. The right hand side is the benefit-cost ratio of an increase in the signal. Let us remind that the signal is the actions initiated by the managers in favor of recruitment and selling and for which the cost does not depend on the quantity produced or sold. Therefore, according to (21), the signal contributes less to selling time than the commission rate on sales. This result can explain why most of the MLM companies initiate such actions not for all the distributors but for a minority which has been involved for long time.
Conclusion

The multi-level market (MLM) is a sort of two-sided market as defined by ?, ?, or ?, with some particularities. The platform is represented by the promoter of the MLM and the sides are the recruitment activity and the selling activity. Here, the recruitment side has negative network effect on the selling side, and the selling side generates positive network effect in favour of the recruitment side. We find that the profit-maximizer’s decision is different from the social planner’s decision. Indeed, like the market studied by ?, the MLM two-sided market is characterized by some distortions. Specifically, there are two types of distortion. The first distortion is generated by the cross network effect between the two sides of the market. This is the standard failure of the market due to the presence of externality (?????). The cross network effect distortion comes mainly from the recruitment side. The positive network effect from the selling side is not a severe cause of distortion. Precisely, if there is only the selling side network effect and no other imperfection then we can implement a policy that meets both the profit-maximizer and the social planner’s conditions. Therefore, the multi-level marketing is a kind of two-sided market where the distortion comes mainly from one side.

The second type of distortion stems from the signal the promoter uses to increase the valuation of the business and the product. Because this signal increases artificially the valuation of the business, and does not add any market value to the product, it leads to market imperfection. However, the negative network effect from the recruitment side helps mitigate that signal distortion. This is another particularity of the MLM where one type of distortion mitigates the other type of distortion. Moreover, contrary to the newspapers two-sided market, there is no Spence distortion because the MLM members are homogeneous regarding the network effect from the other side.

We also find that whether the decision-maker is the social planner or the profit-maximizer, the larger the recruitment side population,
the more the MLM promoter sells his product. Indeed, even though recruitment deters selling incentive, the decision-maker could choose the commissions on sales and the wholesale price to mitigate that recruitment effect. The level of the commissions rate on sales and on recruitment are crucial instruments to meet the challenge of network effect internalization. If the promoter does not choose adequately the commissions rate, distributors can be turned towards more or less recruitment.
Appendix

A Proof of Proposition 2.1

From equations (7) - (9) we can write

\[
\left(-m \frac{\partial Q}{\partial t} + \frac{\partial \xi}{\partial t}\right) \frac{\partial t}{\partial A} + \left(-m \frac{\partial Q}{\partial \tau} + \frac{\partial \xi}{\partial \tau}\right) \frac{\partial \tau}{\partial A} = 0 \tag{22}
\]

\[
\left(-m \frac{\partial Q}{\partial t} + \frac{\partial \xi}{\partial t}\right) \frac{\partial t}{\partial B} + \left(-m \frac{\partial Q}{\partial \tau} + \frac{\partial \xi}{\partial \tau}\right) \frac{\partial \tau}{\partial B} = 0 \tag{23}
\]

\[
\left(-m \frac{\partial Q}{\partial t} + \frac{\partial \xi}{\partial t}\right) \frac{\partial t}{\partial c} + \left(-m \frac{\partial Q}{\partial \tau} + \frac{\partial \xi}{\partial \tau}\right) \frac{\partial \tau}{\partial c} = 0. \tag{24}
\]

Rearranging we find

\[
\frac{-m \frac{\partial Q}{\partial t} + \frac{\partial \xi}{\partial t}}{-m \frac{\partial Q}{\partial \tau} + \frac{\partial \xi}{\partial \tau}} = \frac{\frac{\partial \tau}{\partial A}}{\frac{\partial t}{\partial A}} = \frac{\frac{\partial \tau}{\partial B}}{\frac{\partial \tau}{\partial B}} = \frac{\frac{\partial \tau}{\partial c}}{\frac{\partial \tau}{\partial c}}. \tag{25}
\]

From (10) we have \((p - m) \frac{\partial Q}{\partial v} = 1\). So

\[
\frac{\partial Q}{\partial t} \frac{\partial t}{\partial v} + \frac{\partial Q}{\partial \tau} \frac{\partial \tau}{\partial v} = \frac{1}{p - m}. \tag{26}
\]

Therefore

\[
\frac{\partial Q}{\partial \tau} + \frac{\partial \xi}{\partial \tau} = \frac{\frac{1}{p - m} \frac{\partial v}{\partial \tau} - \frac{\partial \tau}{\partial v}}{\frac{\partial t}{\partial v}} \tag{27}
\]

Using (25) we find the last equality.
B Proof of Proposition 2.2

From Proposition 2.1 we can have

\[
\frac{(p - m) \frac{\partial Q}{\partial t}}{(p - m) \frac{\partial Q}{\partial \tau}} + \frac{\partial p}{\partial t} \frac{Q}{(p - m) \frac{\partial Q}{\partial \tau}} = - \frac{\partial \tau}{\partial A} \frac{\partial t}{\partial A} > 0.
\] (28)

Because \( p + A - c > 0 \) (the sellers will not accept negative profit) and \( c > A + m + B > A + m \) we have \( p - m > 0 \). Also \( \frac{\partial Q}{\partial \tau} > 0 \) and \( \frac{\partial p}{\partial t} < 0 \). Therefore, from the inequality in (28) we find that \( \frac{\partial Q}{\partial t} > 0 \).

C Proof of Proposition 3.1

From equations (14) and (15) we have

\[
-Q + (c - m - A - B) \left( \frac{\partial Q}{\partial t} \frac{\partial t}{\partial A} + \frac{\partial Q}{\partial \tau} \frac{\partial \tau}{\partial A} \right) = 0
\] (29)

\[
-Q + (c - m - A - B) \left( \frac{\partial Q}{\partial t} \frac{\partial t}{\partial B} + \frac{\partial Q}{\partial \tau} \frac{\partial \tau}{\partial B} \right) = 0
\] (30)

Then we have

\[
\frac{\partial Q}{\partial t} \frac{\partial t}{\partial A} + \frac{\partial Q}{\partial \tau} \frac{\partial \tau}{\partial A} = \frac{\partial Q}{\partial t} \frac{\partial t}{\partial B} + \frac{\partial Q}{\partial \tau} \frac{\partial \tau}{\partial B}
\] (31)

Rearranging (31), we find

\[
-\frac{\partial \tau}{\partial Q} \frac{\partial Q}{\partial t} = \frac{\partial t}{\partial A} - \frac{\partial t}{\partial B}
\] (32)

In the same way, from equations 14 and 16, and from 14 and 17 we have respectively

\[
-\frac{\partial \tau}{\partial Q} = \frac{\partial t}{\partial A} + \frac{\partial t}{\partial c}
\]

and

\[
-\frac{\partial \tau}{\partial Q} = \frac{\partial t}{\partial A} \frac{\partial K}{\partial v} - \frac{\partial t}{\partial v} Q
\] (33)

where \( K(v) = v \).