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Introduction of a communal association into the neighborhood: household segregation and welfare analysis

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The purpose of this paper is to develop a theoretical model analyzing the economic ramifications (including on household welfare) of the introduction of a communal association into a neighborhood. The framework of the model is adopted from the industrial organization literature and allows for both vertical and horizontal product (here neighborhood) differentiation. In the baseline case heterogeneous households choose a residential area solely based on their preference for safety. After the introduction of a communal association household choice is conditioned upon the type of the association, and takes into account local amenities. The type of association depends on its relative efficiency in performing two functions: an increase in safety of a neighborhood (decrease of disamenity) and improvements in site characteristics and social network (increase of local amenities). The conclusions of the model suggest that the introduction of a communal association benefits mostly households who have a strong preference and willingness-to-pay for safety, i.e. high-income group. At the same time low-income households may not be able to afford to join the association or even a safe neighborhood. Making neighborhood improvements less expensive will have a significant impact on aggregate welfare. The results of the model show also that a community development policy, orientated solely towards safety, increases the household segregation. In contrast, community policy aimed at increasing amenities benefits a wider number of households and decreases segregation.

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Introduction

The communal association in this paper is understood as any voluntarily organization of households within a neighborhood which pools resources in cooperative effort to improve the area well-being, to provide public services to its members, or to achieve some other group goal. Under this definition, the communal association encompasses both formal (e.g. common interest developments, planned developments, homeowners associations) and less formal (e.g. landscape design coordination, preparation of Christmas party) self-organization of neighbors. This association may be house tenure-long or sporadic, aiming at achievement of a specific goal.

The importance of neighborhood associations is widely recognized in the urban economic literature. First, communal associations may contribute to the improvement of neighborhood amenities (e.g. nice site view, well-maintained public spaces) or elimination of disamenities (e.g. crime, drug abuse, tampering with parked vehicles), which in turn may raise housing property value (see Galster et al., 2004; Gibbons, 2003; Lynch and Rasmussen, 2004). These organizations may also influence households recycling behavior, further the issues of environment protection and combat pollution (Daniere et al., 2002). Ultimately amenities and disamenities are capitalized in the price of the housing property according to hedonic price models (Mark and Goldberg, 1985; Bartik, 1988; Cheshire and Sheppard, 1995).

Second, associations often play the role of the local government (Webster, 2003) when the latter is ineffective in providing local goods and services, including snow removal, garbage collection, street cleaning, and street lightening (Gordon, 2004). These types of associations frequently take the form of common interest developments, such as condominiums, co-operatives, and planned developments. Besides providing traditional public goods, associations can be organized for the purpose of supplying the member households with club goods, for instance common swimming pool, gym, walking path, etc.

Third, communal associations allow people to gain control over their life and their neighborhood (Taylor, 2003). This function refers to community policing, screened entrance for living in a neighborhood, and socioeconomic discrimination in the real estate market. An extreme case of such communal associations are gated communities (Gooblar, 2002; Thuillier, 2005; Blandy and Lister, 2005; Le Goix, 2005). Gated communities are frequently presented in the literature in negative terms, based on the common assumption that they are a major factor in the intensification of social segregation. However, some research shows (e.g. Manzi and Smith-Bowers, 2005) that in contrast to received wisdom, gating can help to foster social cohesion in an area by involving different income groups to increase safety and enhance the local environment by preventing unsolicited entry.

Fourth, communal organizations play an important role in fostering social capital by providing a forum for face-to-face communication. The benefits of social capital for community are similar to agglomeration economies for firms (Lall et al., 2004). Any type of neighborhood organization is based on sharing norms, and it leads to the formation common ground, views, and concerns about particular issues, such as safety of the area, cleanness of common spaces, etc. Active communal associations increase citizen participation in local initiatives and even have an impact on the formation of civic society (Rich, 1980; Docherty et al., 2001; Glasze, 2005). Often households are willing to pay more for living in a neighborhood with higher educational level (Gibbons, 2003). And not surprisingly surroundings were demonstrated to have a significant influence on an individual's socioeconomic career in the form of education, occupational status and income (Friedrichs et al., 2003; Andersson, 2004).

The participation of households in a communal association ultimately depends on how effective is the association in performing the discussed above functions. However, this was not an exhaustive list. There are other factors which influence how active and committed to the association the member-households will be (e.g. financial capabilities, social position, location of the neighborhood). Homeownership encourages the sense of place and the feeling of social belonging, and that in turn raises the willingness to participate in the neighborhood activities (Grange and Ming, 2001; Grant, 2001). Moreover it was shown elsewhere (Lall et al., 2004) that tenure security has a significant impact on the willingness of residents to participate in solving common problems.

The purpose of the current paper is to develop a theoretical model analyzing the economic ramifications (including on household welfare) of the introduction of a communal association into a neighborhood. The model proposed in the paper is based on concepts developed in the industrial organization literature, particularly the model of product differentiation. Traditional models considering the choice of a neighborhood assume a representative household (see recent: Galster et al., 2004; Gibbons, 2003; Lall et al., 2004). In contrast, the present framework accounts for the household heterogeneity with respect to some differentiating attribute.

In this paper the differentiating attribute is assumed to be the household preference for safety. This allows to capture a range of preferences: from households with high tolerance toward unsafe environment to those who strongly prefer to live in a safe area. The safety of a neighborhood recently received significant attention in the literature and is agreed to be one of the major determinants of the quality of a residential area (see for instance Sampson, 2004; Kerslake, 2004; Gordon, 2004; Grant, 2001; Santiago et al., 2003).

The rest of the paper is constructed in the following manner. The second section presents the baseline model of a household choice over two vertically differentiated neighborhoods (unsafe and safe). The following section discussed the change in household choice due to the introduction of a communal association. The fourth section considers the economic ramifications of a communal association including welfare and segregation effects. Final section provides policy suggestions and concludes.

Household choice of safe and unsafe neighborhood: a baseline case

The baseline version of the model establishes the initial household demand for a particular neighborhood in the market (methodology adopted from Giannakas and Yiannaka, 2005). The essential assumptions of the model are as follows. First, assume that all residential areas in the city can be assigned to one of two types of neighborhoods: safe or unsafe. Safe neighborhood refers to one with low crime rate, drug-free environment, and psychologically comfortable living conditions. Safety of the neighborhood is defined by individual perception, word-of-mouth communication, as well as formal crime statistics indicators.

Second, assume that all households generally agree in labeling a particular neighborhood as safe or unsafe. At the same time households are heterogeneous: they differ in the degree of preference for neighborhood safety. Some households (e.g. families with young children) place greater value on the neighborhood safety; others (e.g. poor single male students) are not as concerned about safety issues.

Third, assume that all households are uniformly distributed with respect to their preference for safety (i.e. there is equal number of households who place any particular value on neighborhood safety). The uniform distribution significantly simplifies the analysis but can be substituted by any other distribution without influencing the structure of final results.

Fourth, assume that the quality (dwelling and site characteristics) of all houses in the city is the same, and a household selects its residential location only in terms of safety. One may argue that this assumption is very strong and unrealistic. However, the purpose of the model is to analyze the incremental change in utility after the introduction of a communal association, so that the initial utility level is not a crucial parameter.

Safe and unsafe neighborhoods are uniformly quality ranked by households, in another words they represent vertically differentiated products. Particularly, if prices of living in safe and unsafe neighborhood are the same, all households prefer to live in safe areas (criminals who may favor an unsafe environment in order to escape from the police are excluded from this analysis). However, as explained below, price of living in safe and unsafe neighborhoods are different. This allows for both types of residential areas co-exist in the market.

Price of living in the safe neighborhood is higher than in the unsafe because of two reasons. First, entrance “fees” for living in a safe neighborhood may be relatively high: households moving into the area may need to have a credit check, approval or recommendation. Second, the residents may have to pay monetary dues or spend time in participating in activities to ensure safety (e.g. neighborhood watch).

Safety preference and household choice of a neighborhood

Consider a household deciding in which neighborhood to live within a particular city. It faces two utilities depending on which neighborhood it selects:

$u_s = u - p_s + \beta\alpha$ - if a household decides to live in a safe neighborhood; (1)

$u_{ns} = u - p_{ns} - \gamma\alpha$ - if a household decides to live in an unsafe neighborhood; (2)

The first component in both utility functions is the basic utility of living in this city (u); the second is the price of living in a safe (p_s) or unsafe (p_{ns}) neighborhood. Both prices are relatively small with respect to the households' income. It is assumed that the basic utility exceeds prices of living in both areas. The third component depends on the differentiating attribute $\alpha \in [0;1]$. In this model the differentiating attribute is assume to be the preference for safety. Households with higher α place higher value on the neighborhood safety than those with lower α.

Whenever a household with the safety preference α chooses a safe neighborhood it gets additional utility $\beta\alpha$. The enhancement factor β ($\beta>0$) is associated with advantages of a safe neighborhood, such as reduced crime rates, drug-free environment, etc. In this case the reduction in the utility due to the relatively high price of a safe neighborhood can be offset by the augmentation of utility due to enhanced safety. Ultimately total utility of a safe neighborhood rises with the increase in safety preference (positively slopped utility function on Figure 1).

Whenever a household with the preference for safety α chooses an unsafe neighborhood, its net utility (basic utility minus price) decreases by $\gamma\alpha$. The discount factor γ ($\gamma \geq 0$) is associated with the downside of living in an unsafe neighborhood and reflects the likelihood of being a crime victim, the danger that kids may be involved with drugs, etc. Here the more household values safety, the lower total utility it will get of living in an unsafe neighborhood (negatively slopped utility function on Figure 1).

The intersection point of two utilities is a divider between those who favor safety and those who are less concerned about it. Similarly to the choice of a community (Tiebout, 1956), utility maximizing household picks a neighborhood which best satisfies its preference pattern for the safety. Thus the effective utility curve consists of two parts: up to the intersection point it is represented by the utility of an unsafe neighborhood, after the intersection – by the utility derived from a safe neighborhood.

Market shares of safe and unsafe neighborhoods

The market share of safe and unsafe neighborhood is defined by a median household, who gets the same utility of living in either neighborhood: $u_s = u_{ns}$. After equating (1) and (2) and solving for a differentiating attribute α the safety preference level of an indifferent household is obtained:

$$\alpha_{ns} = \frac{p_s - p_{ns}}{\beta + \gamma}. \tag{3}$$

A household with the preference for safety $\alpha \in [0;\alpha_{ns})$ gets higher utility by living in an unsafe neighborhood as a result of taking advantage of its relatively low price. A household with the preference for safety $\alpha \in (\alpha_{ns};1]$ chooses to pay more but live in a safe neighborhood. The effective utility curve is the upper envelop of the two curves (bold dashed kinked curve on Figure 1).

Since households are uniformly distributed with respect to the preference for safety, the level of α, corresponding to an indifferent household α_{ns} also represents the market share of unsafe neighborhoods. The market share of safe neighborhoods will then be $1-\alpha_{ns}$.

All households in the city can be normalized at unity without the loss of generality. Then the market shares of each neighborhood are equal to their corresponding demands. Specifically the demand for the unsafe (x_{ns}) and the safe (x_s) neighborhoods are respectively:

$$x_{ns} = \alpha_{ns} = \frac{p_s - p_{ns}}{\beta + \gamma} \tag{4}$$

$$x_s = 1 - \alpha_{ns} = \frac{\beta + \gamma - (p_s - p_{ns})}{\beta + \gamma} \tag{5}$$

The greater is the difference between the price of living in a safe and an unsafe neighborhood the greater will be the demand for a residence in an unsafe neighborhood. If $p_s \leq p_{ns}$ then all households prefer safe neighborhoods, and there is no demand for unsafe neighborhoods ($x_s = 1$, $x_{ns} = 0$). If the price difference is greater than $\beta + \gamma$, then all households opt for the unsafe neighborhoods ($x_s = 0$, $x_{ns} = 1$). The greater is the discount factor for an unsafe environment or the greater is the enhancement factor for safety or both, the greater will be the demand for a safe neighborhood.

If the distribution of households with respect to the preference for safety is continuous, but not uniform, then the demand for a specific type of neighborhood depends on the skewedness of the distribution. The more it skewed to $\alpha = 1$, the higher is the demand for a safe neighborhood and vice versa.

Aggregate household welfare

Consider the baseline effective utility curve (bold dashed kinked curve on Figure 1). A household which is indifferent between living in a safe or an unsafe neighborhood gets the following level of utility:

$$u_{ns}(\alpha_{ns}) = u_s(\alpha_{ns}) = u - \frac{p_{ns}\beta + p_s\gamma}{\beta + \gamma}\left(= u^*\right) \tag{6}$$

From Figure 1 it is apparent, that such a household is worse off then any other household: its level of utility is the least possible. A household with relatively tolerant attitude towards an unsafe area receives some higher point on the utility curve u_{ns}. Its welfare is the area underneath the effective utility curve and to the left of α_{ns}. On the other hand a household relatively less tolerant towards unsafe environment reaches a higher point on the utility curve u_s. By analogy its welfare is the area underneath the effective utility curve and to the right of α_{ns}.

Aggregate household welfare consists of the two aforementioned areas and equals:

$$\begin{aligned} HW &= \frac{1}{2}\left[u - p_{ns} + u^*\right](\alpha_{ns}) + \frac{1}{2}\left[u - p_s + \beta + u^*\right](1 - \alpha_{ns}) = \\ &= u - p_s + \frac{\beta}{2} + \frac{(p_s - p_{ns})^2}{2(\beta + \gamma)} \end{aligned} \tag{7}$$

Comparative statics can be derived from the equation (7). The higher the basic utility (*u*) the greater is household welfare. If prices of living in a safe (p_s) or unsafe (p_{ns}) neighborhoods are increasing, then household welfare is decreasing (given that both neighborhoods enjoy positive market shares). The increase in the safety enhancement factor (β) or/and decrease in the discount factor (γ) lead to increases in household welfare.

Introduction of neighborhood with a communal association

Suppose that a new type of neighborhood appears on the housing market – a neighborhood with a communal association. Such an association accomplishes two functions. First it decreases disamenities, particularly it raises the area safety above its level in a safe neighborhood. The association forms a community policing policy by, for instance, establishing "working partnership … (with) the police … to reduce crime and enhance security" (Sampson, 2004, p.110). In contrast to police, the association focuses on safety-related problems which are behind the crime itself, such as drug markets, disorderly bars, abandoned housing, etc. The second function of the communal association is to increase local amenities. The association provides some local public services, improves environmental quality and the exterior features of houses and lots. It also offers a venue for a formation of a social network and a forum for interpersonal communication (for an extensive discussion of benefits see also Kleinman, 1999; Sampson, 2004).

The drawback of the second function is that compliance with community rules is costly in monetary and time commitment terms (Parkes et al., 2002). Moreover there is a danger of an "iron cage effect": social proximity may lead to increased attention from association members and possible dangers of snitching or tattle-telling. The introduction of a communal association into the neighborhood may also have an ambiguous effect, such as fostering socioeconomic and racial segregation (Cervero and Duncan, 2004) and social exclusion (Nelson et al., 2004).

Communal association and household choice of a neighborhood

The utility of a household living in a neighborhood with a communal association (u_c) is given by the following function:

$$u_c = u + m - p_c + (\beta + \lambda)\alpha \qquad (8)$$

Here p_c – is the price of living in an associated neighborhood (e.g. entrance screening, seeking recommendation, higher membership fees, time devoted to community service). The price of such neighborhood is ultimately higher than that of a safe neighborhood ($p_c > p_s > p_{ns}$). In addition to a basic utility (u) presented above for the unsafe and safe neighborhoods, there is a utility (disutility) specific only for the association – m ($m \neq 0$). Positive values of m reflect an increase in amenity. Negative values of m are related to an iron cage effect. Since the introduction of an association enhances a residential area safety, household utility increases by $\lambda\alpha$ ($\lambda>0$) above the utility of a safe neighborhood.

In terms of the household choice of a residential area there is a modification in comparison to the baseline case. The introduction of neighborhoods with communal association alters the household decision making process regarding the selection of a residential area. In contrast to safe and unsafe neighborhoods, which are uniformly quality ranked by households, associated neighborhoods are not uniformly quality ranked either with safe or unsafe areas. As it follows from formulas (1), (2), and (8) while safe and unsafe neighborhoods are still vertically differentiated (if $p_s = p_{ns}$, then $u_s > u_{ns} \ \forall \alpha$), communal association can be also horizontally differentiated from other areas for certain values of parameters $m, \beta, \lambda,$ and γ.

First, discuss the differentiation of an associated neighborhood from a safe neighborhood. Apparently, even if the prices of living in both areas are the same, a household can not arbitrarily prefer one neighborhood over the other (if $p_c = p_s$, then

$u_c \gtrless u_s \quad \Rightarrow \quad u + m - p_c + (\beta + \lambda)\alpha \gtrless u - p_s + \beta\alpha \quad \Rightarrow \quad m \lessgtr -\lambda\alpha$). Whenever $m < -\lambda\alpha < 0$ association and safe neighborhoods are horizontally differentiated. In that case everybody benefits if both types of areas exist (given the above $p_c = p_s$). Households with low preference for safety (i.e. those with $\alpha \in \left[0; -\frac{m}{\lambda}\right)$) choose safe neighborhoods; whereas households with high preference for safety (i.e. those having $\alpha \in \left[-\frac{m}{\lambda}; 1\right]$) opt for a communal association area. The intuitive explanation of horizontal differentiation lies in the fact that *m* is negative here. It reflects that there is a trade off between an increased level of safety and the iron cage effect. Whenever $m \geq -\lambda\alpha$ the utility curve of the associated neighborhood lies above the utility curve of a safe neighborhood for all safety preference levels. This means that association and safe neighborhoods are vertically differentiated ($u_c \geq u_s \ \forall \alpha$). Specifically if the additional utility of living in a communal association is positive and prices are the same, then an association will be always preferred over a safe neighborhood.

Differentiation of communal association and unsafe neighborhood is similar to the distinction made between associated and safe areas. If $p_c = p_{ns}$, then the comparison of utilities indicate the following: $u_c \gtrless u_{ns} \quad \Rightarrow \quad u + m - p_c + (\beta + \lambda)\alpha \gtrless u - p_{ns} - \gamma\alpha \quad \Rightarrow \quad m \lessgtr -(\beta + \lambda + \gamma)\alpha$. Whenever $m < -(\beta + \lambda + \gamma)\alpha < 0$ association areas and unsafe neighborhoods are horizontally differentiated. Households which are more tolerant towards an unsafe environment (i.e. those with $\alpha \in \left[0; -\frac{m}{\beta + \lambda + \gamma}\right)$) choose to live in the unsafe neighborhoods; whereas the rest (i.e. those having $\alpha \in \left[-\frac{m}{\beta + \lambda + \gamma}; 1\right]$) select an area with a community association. By analogy with the above, households make a choice between increased safety and the iron cage effect. Whenever $m \geq -(\beta + \lambda + \gamma)\alpha$ the utility curve of an association area lies above the utility curve of an unsafe neighborhood for all safety preference levels: association and unsafe neighborhood are vertically differentiated ($u_c \geq u_{ns} \ \forall \alpha$). Again, if the additional utility of living in an associated neighborhood is positive and prices are the same, then the associated area will be always preferred over an unsafe neighborhood.

Market share of five types of neighborhoods

Introduction of a community association results in change in the market shares of the safe and unsafe neighborhoods. Depending on the parameters of the model, there are 5 possible types of the communal association.

Type 1 (the communal association dominance):

If the association area utility curve lies above the utilities of both safe and unsafe neighborhoods (i.e. $0 < p_c - p_{ns} \le m$) then all households prefer to live in a communal association and other types of neighborhoods are driven out of the market (Figure 2). The effective utility curve is the top bold dashed line on this figure. Demands (and market shares) for unsafe, safe neighborhood, and communal association are respectively:

$$x'_c \left(= \alpha'_c\right) = 1, \tag{9}$$

$$x'_s \left(= \alpha'_s\right) = 0, \tag{10}$$

$$x'_{ns} \left(= \alpha'_{ns}\right) = 0 \ . \tag{11}$$

This situation is potentially possible, but seems to be unrealistic. Naturally communal associations with extremely high positive externalities are advantageous for residents, but most likely are very expensive. In this particular case households totally recover the costs associated with living in such neighborhood, since the price premium of living in an area with communal association above the unsafe neighborhood is less than the benefits derived from it. Moreover households belonging to the association receive an increased level of safety.

Type 2 (the balanced communal association):

If additional utility of living in an associated neighborhood is positive, but not very large, then the association utility line lies above the safe neighborhood line. In this situation (Figure 3):

$$u - p_s \leq u + m - p_c < u - p_{ns} \quad \Rightarrow \quad 0 < p_c - p_s \leq m < p_c - p_{ns} \tag{12}$$

The benefits of membership in an association exceed the association price premium paid over a safe neighborhood. However households can not recover the price premium paid over an unsafe neighborhood. Safe neighborhoods are driven out of the market ($u_c > u_s \ \forall \alpha$). The communal association of type 2 is called the balanced association because it both increases local amenities and decreases disamenities. Thus this type of a communal association attracts a wider circle of households and as a result decreases the household segregation into unsafe and association neighborhoods based on the socioeconomic characteristics.

The new effective utility curve is the bold dashed kinked line on Figure 3. It turns out that household with high preference for safety votes with its feet (Tiebout, 1956) and moves to the neighborhood with the association. In fact, the associated residential area gets the market share not only of the safe neighborhoods, but also some fraction of unsafe ones (which lies between the intersections of safe-unsafe and unsafe-association).

The market shares of two types of areas are defined by a median individual, who is indifferent between living in an unsafe neighborhood or in a neighborhood with an association. Using the same approach as in the baseline model, equate $u_c = u_{ns}$ and solve for a safety preference *α*. Similarly the demand equals the market share since all households are normalized at unity. The demands (and market shares) for unsafe neighborhoods, safe neighborhoods, and communal association areas are respectively:

$$x''_{ns} \left(= \alpha''_{ns} \right) = \frac{p_c - p_{ns} - m}{\beta + \lambda + \gamma}, \tag{13}$$

$$x''_{s} \left(= \alpha''_{s} \right) = 0, \tag{14}$$

$$x''_c \ (= 1 - \alpha''_{ns}) = \frac{\beta + \lambda + \gamma - (p_c - p_{ns} - m)}{\beta + \lambda + \gamma}. \quad (15)$$

After the introduction of an association, given the above parameters, households with relatively high preference for safety (with $\alpha \in (\alpha_{ns};1]$) switch their consumption from safe neighborhoods to an area with an association. They enjoy the highest increase in the welfare (see discussion below). The introduction of an association benefits households which are more tolerant toward unsafe environment (with $\alpha \in (\alpha''_{ns};\alpha_{ns}]$) as well. Their utility increases substantially (Figure 3). There is no effect for households very tolerant towards unsafe area (those with $\alpha \in [0;\alpha''_{ns})$).

Type 3 (the super safe communal association):

Additional utility (*m*) of living in the super safe communal association is smaller than the price premium paid for this area above the safe neighborhood, but this is compensated by the dramatic increase in safety (Figure 4). The third type is similar to the second; however those types can not be grouped together since they require different conditions for existence:

$$p_c - p_s > m \quad (16)$$

and

$$\alpha'''_{ns} \le \alpha_{ns} \quad \Rightarrow \quad \frac{p_c - p_{ns} - m}{\beta + \gamma + \lambda} \le \frac{p_s - p_{ns}}{\beta + \gamma} \quad \Rightarrow \quad \frac{p_c - p_s - m}{p_s - p_{ns}} \le \frac{\lambda}{\beta + \gamma} \quad (17)$$

In the previous cases the household choice was determined only by the magnitude of communal benefits. Now for the first time the conditions defining the type depend on the safety enhancement (λ, β) and discount (γ) factors. Here *m* can be negative (i.e. a decline in local amenities). If *m* is negative, the introduction of an association leads to a reduction of household utility in comparison to the safe neighborhood due to, for instance, iron cage effect. In such circumstances an improvement in neighborhood safety ($\lambda\alpha$) has to be large enough to compensate this effect.

The segregation of households into two types of neighborhoods – an unsafe area and an association area is more dramatic here. Super safe communal association drive safe neighborhoods out of the market ($u_c > u_s \ \forall \alpha$). The communal association utility curve should be much steeper than the safe neighborhood utility line. It turns out that the benefits of such association are captured mostly by households with α in the proximity of 1 (those with strong preference for safety).

The demands and market shares of areas are the same as for the type 2 (with different *m* and λ), and are described by the formulas (13)-(15). The effective utility curve is represented by the bold dashed kinked line on the Figure 4. Households with $\alpha \in [\alpha_{ns}^{iii};1]$ opt for neighborhoods with associations. Households who strongly prefer to live in the cheapest area (those to the left of α_{ns}^{iii}) continue to demand an unsafe neighborhood. However, if this communal association assures the same λ as type 2 association, then it will have fewer households switching from the unsafe neighborhoods.

Type 4 (the traditional communal association):

In the traditional communal association the additional utility (*m*) and the enhancement in safety (λ) are relatively small in comparison with associations of type 1-3. In this case the associated neighborhood utility curve intersects the safe neighborhood utility curve. There are two restrictions (Figure 5):

$$m < p_c - p_s < m + \lambda \qquad (16)$$

$$\alpha_{ns} < \hat{\alpha}\left(= \alpha_{ns}^{iv} + \alpha_s^{iv}\right) \quad \Rightarrow \quad \frac{p_c - p_s - m}{p_s - p_{ns}} > \frac{\lambda}{\beta + \gamma} \qquad (18)$$

The total benefits (local amenities and safety) of association membership exceed the price premium paid over the price of a safe neighborhood. The new effective utility curve is the bold dashed kinked line on Figure 5. The type 3 associations impinge on the market share of the safe neighborhoods only. Unsafe neighborhoods keep their customers (the respective demand is equal the baseline demand).

The market shares of safe neighborhoods and the communal association areas are defined by a median individual, who is indifferent between living in those two areas. Solve $u_c = u_s$ for a safety preference α in order to get the aggregate market share of unsafe and safe neighborhoods:

$$\hat{\alpha}\left(= \alpha_{ns}^{iv} + \alpha_{s}^{iv}\right) = \frac{p_c - p_s - m}{\lambda} \tag{19}$$

The demands (and market shares) for unsafe, safe, and associated neighborhoods are respectively:

$$x_{ns}^{iv}\left(= \alpha_{ns}^{iv} = \alpha_{ns}\right) = \frac{p_c - p_{ns}}{\beta + \gamma}, \tag{20}$$

$$x_{s}^{iv}\left(= \alpha_{s}^{iv}\right) = \frac{p_c - p_s - m}{\lambda} - \frac{p_c - p_{ns}}{\beta + \gamma}, \tag{21}$$

$$x_{c}^{iv}\left(= 1 - \hat{\alpha}\right) = \frac{\lambda - \left(p_c - p_s - m\right)}{\lambda}. \tag{22}$$

After the introduction of communal associations there are three segments to the market: households with $\alpha \in \left[0; \alpha_{ns}\right)$ live in unsafe neighborhoods; those with $\alpha \in \left[\alpha_{ns}; \hat{\alpha}\right)$ choose safe neighborhoods; the rest ($\alpha \in \left[\hat{\alpha}; 1\right]$) opt for neighborhoods with a communal association.

This is the most likely outcome in the real world. Most cities have three types of neighborhoods characterized by different amenities and disamenities. The crucial characteristic of this type is that safety is included in the calculation of the price premium of an association over a safe residential areas. The maximum price premium households will be willing to pay equals $p_c - p_s = m + \lambda$. This is a breakeven point for the communal association (marginal costs equal marginal benefits). Here again, *m* can be negative (i.e. a decline in local amenities) as long as increase in safety (λ) is large enough.

Type 5 (the failed communal association):

The communal association, which does not perform its functions at the appropriate level or is unreasonably expensive, falls into this type. The type 5 associations are trying to function below the breakeven: $m + \lambda < p_c - p_s$. However these are driven out of the market by relatively cheaper unsafe neighborhoods and safer safe neighborhoods (Figure 6). The market outcome (in terms of market shares and demands) is the same is in the baseline model.

Change in household welfare and socioeconomic segregation

The introduction of a communal association in the neighborhood alters decisions of some households and leaves others unchanged. The share of households which would be affected by the introduction of a communal association ultimately depends on the type of association (type 5 is excluded from the subsequent discussion since there is no any change in household welfare).

The type of the association in turn depends on how this association will be balancing the increased safety (λ) and additional (dis)utility relative to the prices to live in different neighborhoods (Figure 7). Types 1 and 2 are extreme in the sense that the level of λ does not matter (as long as it is positive). The increase in the amenities due to the introduction of the association is enough to cover additional costs of living in there: the price premium is smaller than the estimated benefits. In this sense type 1 and 2 associations are rather cheap for the society. The decrease in disamenity (enhanced safety) can be accounted as a positive externality, rather than the main effect of the association.

Associations of types 3 and 4 are separated by the line $m = p_c - p_s - \lambda \dfrac{p_s - p_{ns}}{\beta + \gamma}$ which lies to the right of the breakeven line $m = p_c - p_s - \lambda$. This is a consequence of the co-existence of unsafe and safe neighborhoods in the baseline case. If $p_c - p_s < \beta + \gamma$ (both neighborhoods have positive market share), then after the introduction of a communal association the relationship between prices is:

$p_c - p_s - \lambda \frac{p_s - p_{ns}}{\beta + \gamma} > p_c - p_s - \lambda$. Associations of these types are characterized by the trade off between the improved safety and utility of local amenities. As was discussed above, if λ is large, *m* can be negative.

The increase in household welfare due to the introduction of neighborhoods with a communal association is presented as a shaded area between an effective utility curve corresponding to each of the types 1-4 and the baseline (Figures 2-5 and Appendix). If all types of communal associations convey the same level of increased safety, the welfare changes can be arranged in the following way:

$$\Delta HW_1 > \Delta HW_2 > \Delta HW_3 > \Delta HW_4 > 0 \tag{23}$$

Table 1 provides a numerical example demonstrating the household welfare effect of the introduction of different types of communal associations into the neighborhood. The initial parameters were set so that in the baseline the market share of unsafe neighborhoods is 20%, and the market share of neighborhoods with type 4 communal associations is 25%[1]. For the simplicity of calculation the price of an unsafe neighborhood were normalized to zero and the price of associated neighborhood was estimated at 100[2]. In the first quarter of the table the safety improvement λ was fixed at the level 10, and then in the second quarter it was increased by 20%.

Communal associations of types 1 and 2 (the dominance and the balanced association) are the most desirable. Households enjoy considerable increase in the welfare (32.5% and 14.2% type 1 and 2 respectively as shown in Table 1). Those associations are attractive for nearly all households, independently of their safety preference, because they provide a significant improvement in local amenities. The improvement in amenities is valued by households considerably higher than the price of

[1] The share of households-members in neighborhood associations were estimated for a Midwestern city with a population about 200 thousand people. Although the exact estimation of the share is unavailable, approximately 54% of area within the city is serviced by neighborhood associations, with 63% of households living within their boundaries (Information provided by the city government). Given that the membership is voluntarily and involves monetary contributions, it was assumed that the approximately 40% of households within the borders of associations actually belong to them.

[2] The estimated average annual membership fee is $25 per household in the communal association (Information provided by the city government in the Midwestern city). Since the membership requires participation in the different activities and the time commitment, total price of living in the association was assumed to be $100.

living in the associated neighborhood. This means that residents take full advantage of the association benefits, including face-to-face communication, social capital, and provision of local public goods and services. Type 1 and 2 neighborhood associations promote social inclusion and decrease household segregation. At the same time associated neighborhoods of these types are extremely rare in practice.

The super safe communal association (type 3) results in the highest degree of segregation. Households with strong preference and willingness-to-pay for safety get an extreme increase in welfare by switching from a safe neighborhood to the one with a communal association. At the same time households on the lower end of α do not experience any change in the welfare. As a result the change in total household welfare comparing to the baseline is 7.13%. In the traditional communal association (type 4) the benefits are even more concentrated. Associated neighborhoods exhibit a decrease in disamenities, rather than an increase of amenities. Communal actions, such as community policing and neighborhood watch, have limited benefits for the society as a whole. In this case the increase in the household welfare is minimal (0.53%). Communal associations of type 3 and especially type 4 benefit mainly households which are able to pay high price premiums or to agree to a possible loss of freedom (iron cage effect). Based on these factors residents are self-selecting into unsafe, safe and associated neighborhoods, which ultimately leads to household segregation by socioeconomic characteristics.

Since the communal association types are mainly differentiated by the level of amenities, it is impossible to fix m for all types of associations (m was fixed for the pairs of associations of types 2 & 4 and 3 & 5 respectively). The third and the fourth quarters of Table 1 depict the change in household welfare depending on the change in amount of amenities available in different types of associations. An increase in the level of amenities by 2% has different effects on the safety (λ). In type 1 association increase in m leads to the increase in the welfare, but not safety. In associations of type 2 and 3 the augmentation of amenities cause a reduction in safety and vice versa because of the necessary trade off due to scarce resources. At the same time in type 4 communal associations safety and amenities complement each other. Changes in welfare depending on association type do not differ as dramatically here as in the case with fixed λ. This is an additional demonstration that the welfare effect of improved amenities is higher than that of reducing disamenities.

Conclusions

The theoretical contribution of this paper is in: 1) refining the view on communal associations and their influence on household choice of a neighborhood; 2) providing a novel framework for the identification of beneficiaries and the welfare analysis of an introduction of an association into the neighborhood; 3) developing a model which takes into account heterogeneity of households with respect to the preference for a neighborhood safety. The results of the proposed model can be generalized over the variety of amenities or disamenities of a residential area. The safety context of the model can be substituted by other attribute (e.g. tolerance towards the level of pollution, preference for green space or similar landscape design, organizing a Christmas party) and analogous analysis can be performed.

The important ramification of the introduction of a communal association for the residential housing market is such that all types of households benefit if different types of neighborhoods co-exists. In contrast to the unsafe and safe neighborhoods which always are vertically differentiated, the associated areas can be both vertically and horizontally differentiated from safe and unsafe neighborhoods, depending on parameter values. Since type 3 and 4 communal associations in some instances lead to the trade off between enhanced safety and the iron cage effect, such neighborhoods are not uniformly quality ranked by households with respect to either safe or unsafe areas.

The introduction of communal associations of types 1-4 into the neighborhood lead to an unambiguous increase in the aggregate household welfare. However, this increase in welfare does not spread through all households equally. The market outcome resulting from the introduction of associated neighborhoods is likely to be in the form of “traditional association” (type 4). As it was shown, this type overemphasizes safety at the expense of local amenity. The results of the model suggest that the appearance of a communal association benefits mostly households who have a strong preference and willingness-to-pay for safety, i.e. high-income group. Low-income households may not be able to afford to join an associated area or even a safe neighborhood.

A community development policy, promoting traditional associations would lead to an increase of racial and socioeconomic segregation, and social exclusion (providing additional support for Cameron and Field, 2000 and Kearns and Parkinson, 2001). Unsurprisingly this would be asymmetrical for different households: ultimately there exist gated communities (Gooblar, 2002) but there are no gated ghettos.

In contrast, a community development policy aimed at the increase of amenities spreads its influence over wider circle of households, decreases segregation and encourages social cohesion. As it was shown elsewhere (Mitlin, 2001; Docherty et al., 2001) the development of communal organizations is not really possible without strong support from the local and federal government. Specifically making improvements in amenities less expensive will have a significant positive impact on aggregate household welfare.

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Figure 1. Household decisions and welfare of living in unsafe and safe neighborhoods (baseline case).

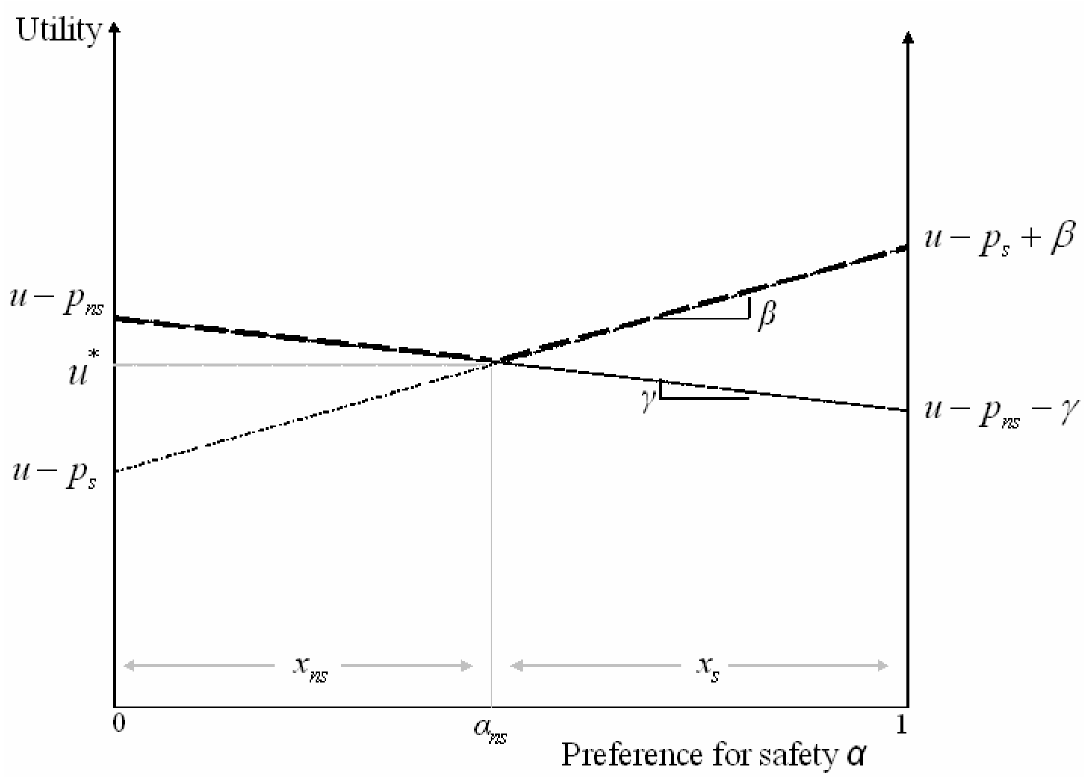

Figure description: The point of intersection of two utilities represents a household which is indifferent between living in a safe and an unsafe neighborhood (differentiating attribute $\alpha = \alpha_{ns}$). Households with high tolerance towards unsafe environment are distributed to the left of intersection point. They choose to live in an unsafe neighborhood (if $\alpha \in [0; \alpha_{ns})$, then $u - p_{ns} - \gamma\alpha > u - p_s + \beta\alpha$).

Individuals with lower tolerance towards unsafe environment are distributed to the right of intersection point and prefer to live in a safe neighborhood (if $\alpha \in (\alpha_{ns}; 1]$, then $u - p_s + \beta\alpha > u - p_{ns} - \gamma\alpha$).

Effective utility curve is represented by a bold dashed kinked line – an upper envelope. Aggregate household welfare is the area below the effective utility curve.

Figure 2. Household decisions and welfare of introduction of an association (Type 1: the communal association dominance).

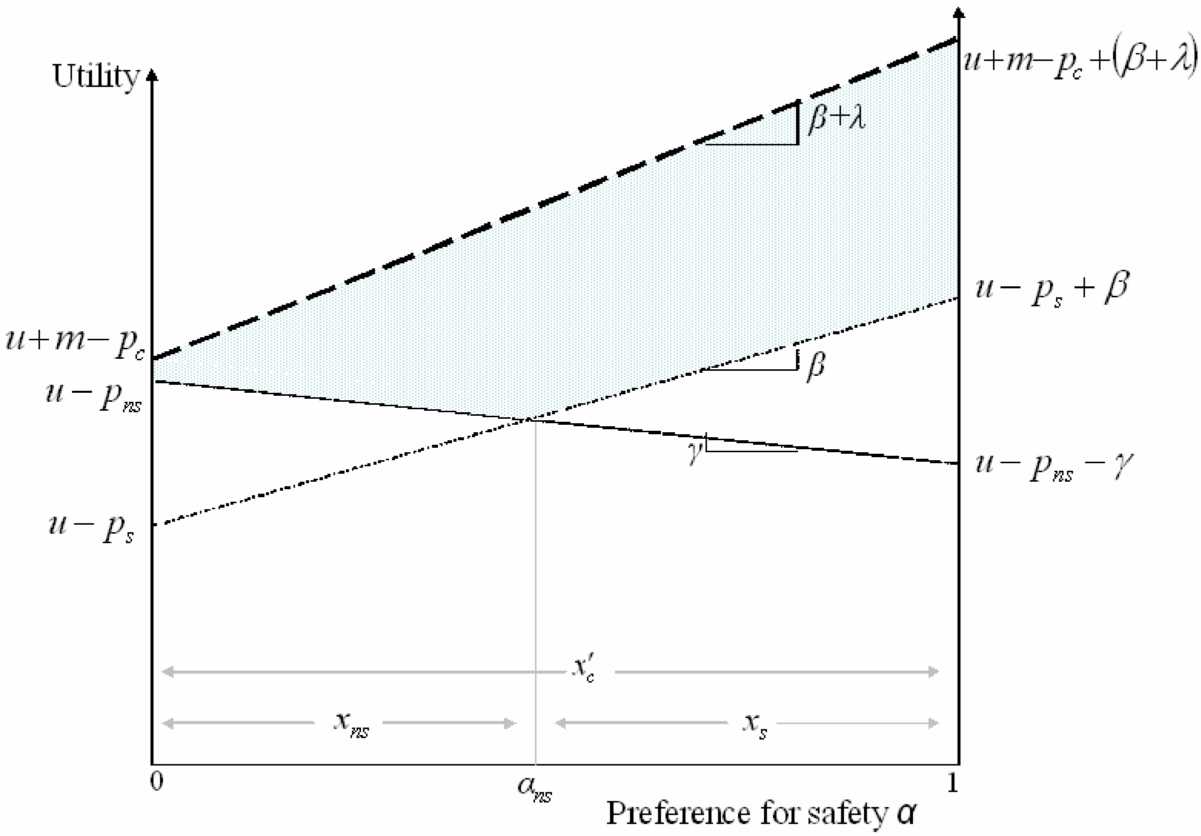

Figure description: The introduction of a communal association alters the market structure. If the benefits of an association are such that $m \geq p_c - p_{ns} > 0$ (given that $\lambda > 0$), then households recover what they overpaid for an association in comparison to an unsafe neighborhood. As a result both safe and unsafe neighborhoods are driven out of the market ($x'_c = 1, x'_s = 0, x'_{ns} = 0$).

Effective utility curve is represented by a top bold dashed line. The shaded area represents the increase in household welfare relative to the baseline case.

Figure 3. Household decisions and welfare of introduction of an association (Type 2: the balanced communal association).

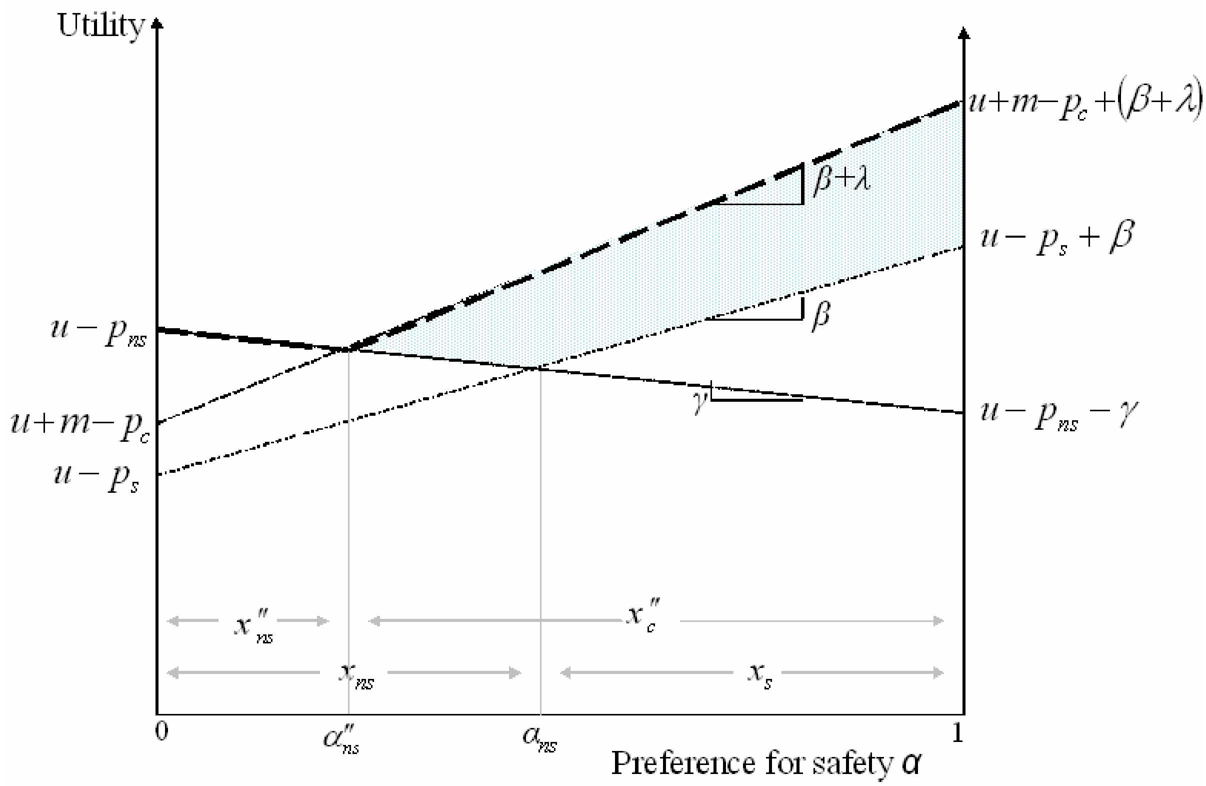

Figure description: Introduction of this type of communal association yields moderate positive benefits. Those benefits can offset the association price premium over of a safe neighborhood, but are too low to offset the association price premium over an unsafe neighborhood:

$$u-p_s \leq u+m-p_c < u-p_{ns} \quad \Rightarrow \quad 0 < p_c - p_s \leq m < p_c - p_{ns}$$

As a result safe neighborhoods are replaced by associations ($x''_s = 0$). Unsafe neighborhoods lost some part of their market share to the neighborhoods with associations ($x''_{ns} < x_{ns}$, $x''_c = 1 - x''_{ns}$).

Effective utility curve is represented by a bold dashed kinked line. The shaded area represents the increase in household welfare relative to the baseline case.

Figure 4. Household decisions and welfare of introduction of an association (Type 3: the super safe communal association).

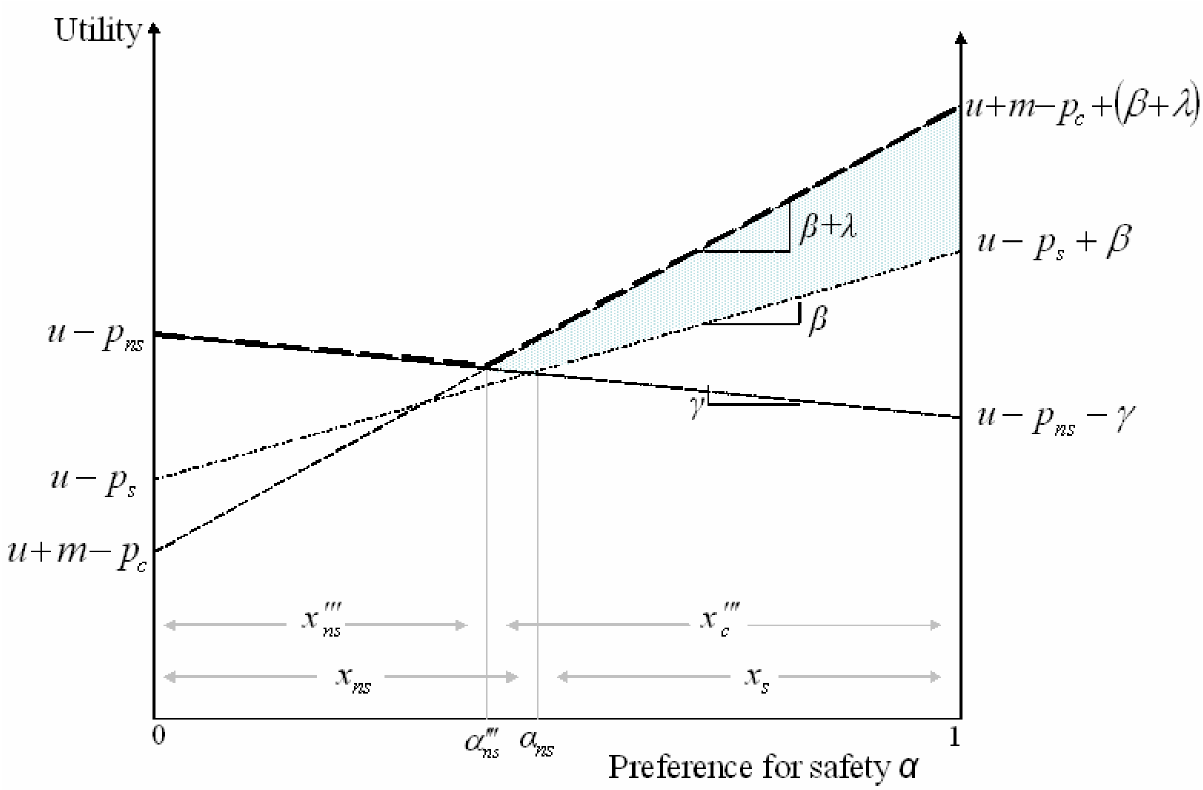

Figure description: Introduction of this type of communal association requires a trade off between increased safety and local (dis)amenities. Safe neighborhoods are replaced by neighborhoods with associations ($x_s^{iii} = 0$). The market share of unsafe neighborhoods decreased with respect to the baseline case ($x_{ns}^{iii} < x_{ns}$, $x_c^{iii} = 1 - x_{ns}^{iii}$).

Effective utility curve is represented by a bold dashed kinked line. The shaded area represents the increase in household welfare relative to the baseline case.

Figure 5. Household decisions and welfare of introduction of an association (Type 4: the traditional communal association).

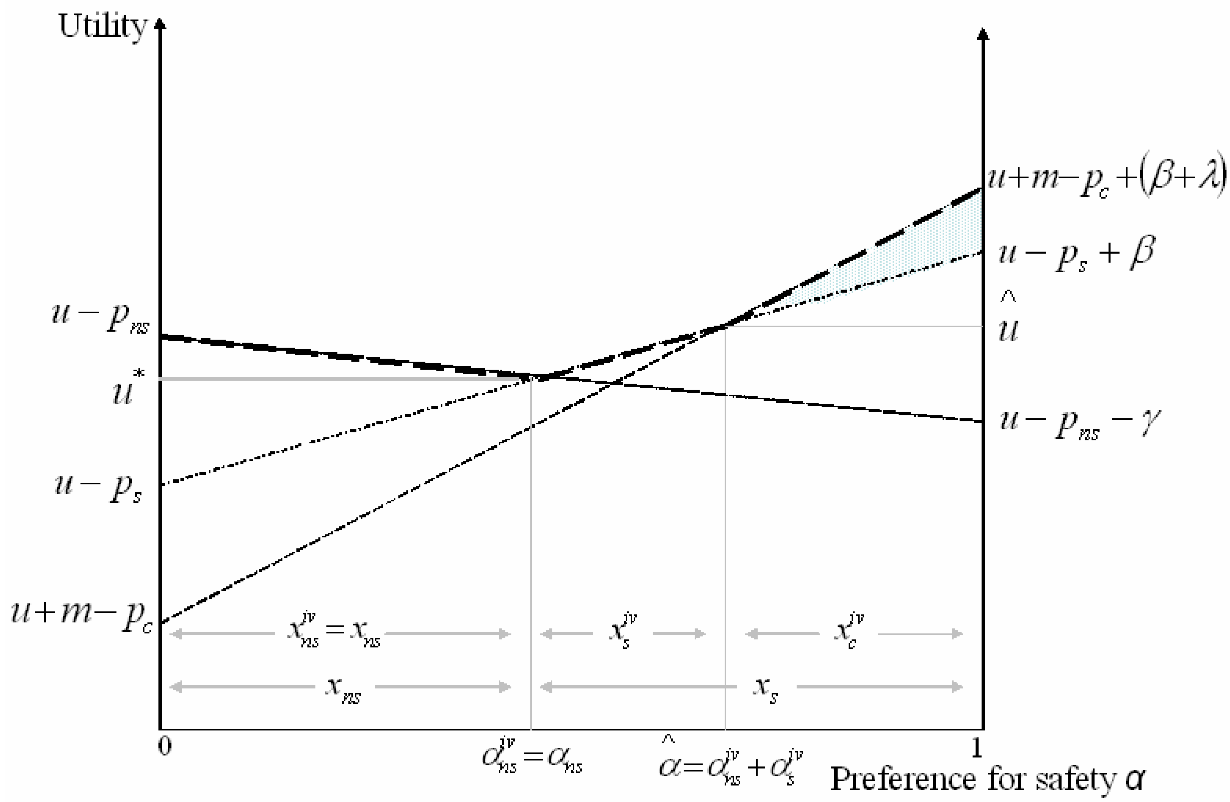

Figure description: Introduction of this type of communal association requires a trade off between increased safety and local (dis)amenities. All three types of neighborhoods are presented in the market (unsafe, safe and associated). The market share of unsafe neighborhoods is the same as in the baseline, however the part of households living in the safe area are now part of the associated neighborhood ($x_{ns}^{ivi} = x_{ns}, x_s^{iv} < x_s$).

Effective utility curve is represented by a bold dashed kinked line. The shaded area represents the increase in household welfare relative to the baseline case.

Figure 6. Household decisions and welfare of introduction of an association (Type 5: the failed communal association).

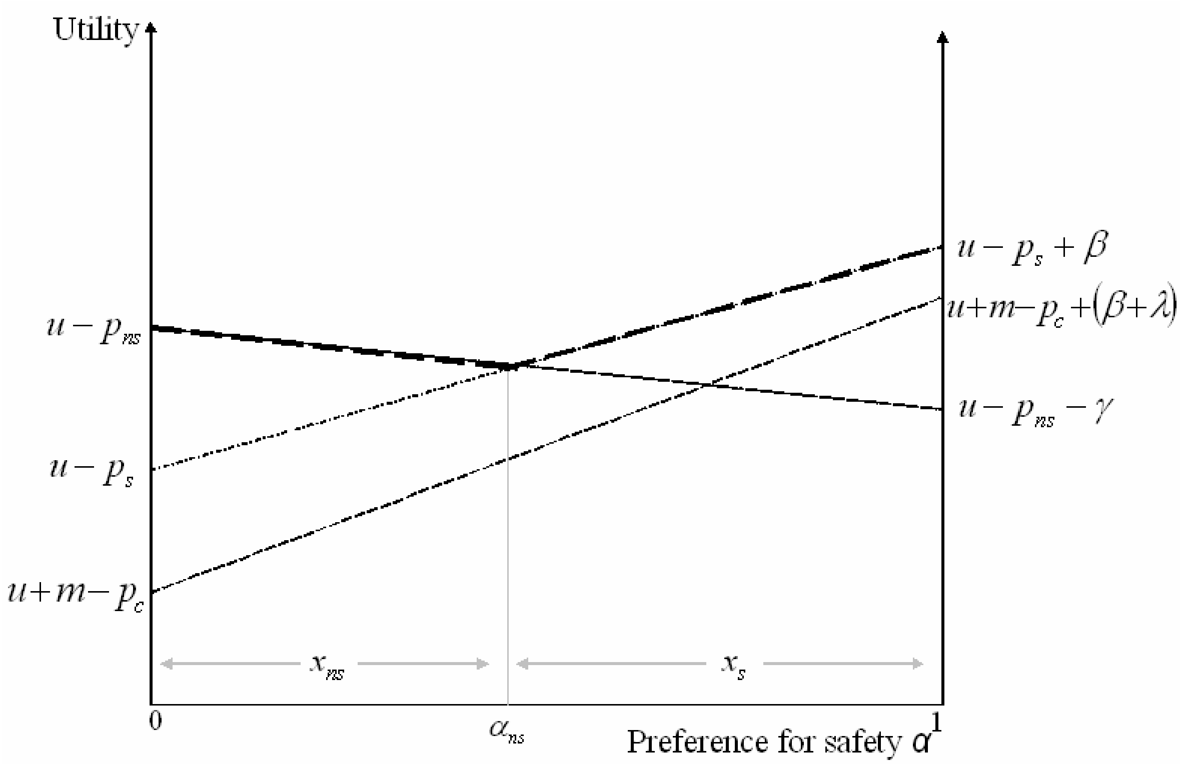

Figure description: Introduction of this type of communal association does not affect the household choice and welfare. The associated neighborhood utility curve lies below the baseline effective utility curve, signaling that the association benefits are below its costs. In this case households continue living in unsafe and safe neighborhoods.

Figure 7. The trade-off between the additional (dis)utility of living in a communal association (m) and increase in safety (λ).

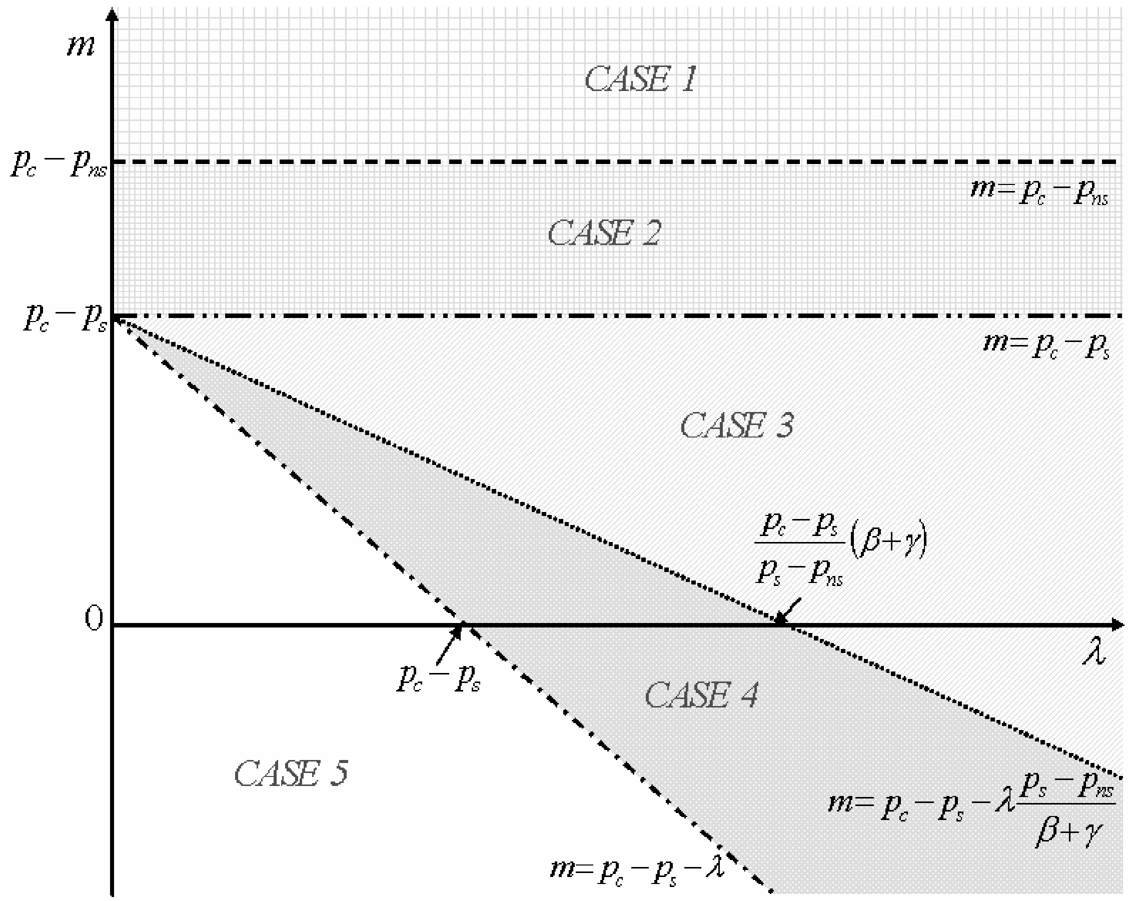

Figure description: All pairs (*λ; m*) which are above $m = p_c - p_{ns}$ represent the communal association dominance (type 1). Pairs (*λ; m*) between the lines $m = p_c - p_{ns}$ and $m = p_c - p_s$ represent the balanced communal association (type 2). Pairs (*λ; m*) below $m = p_c - p_s$ and to the right of $m = p_c - p_s - \lambda \frac{p_s - p_{ns}}{\beta + \gamma}$, including negative *m*, represent the super safe association (type 3). Pairs (*λ; m*) to the left of $m = p_c - p_s - \lambda \frac{p_s - p_{ns}}{\beta + \gamma}$ and to the right of $m = p_c - p_s - \lambda$, including negative *m*, represent the traditional association (type 4). The line $m = p_c - p_s - \lambda$ is a breakeven and to all pairs(*λ; m*) to the left of it represent the failed association (type 5).

Table 1. Household welfare effects of the introduction of different types of a communal association into the neighborhood.

	Initial parameters						**Market shares**			**Association**		**Welfare**		**Elasticity of ch. in *HW***
	u	p_{ns}	p_s	p_c	β	γ	x_{ns}	x_s	x_c	m	λ	*HW*	*% ch.*	
Fix safety improvement (λ=10)														
baseline	50	0	10	---	35	15	0.2	0.8	0	---	---	58.5	0.00	
type 1	50	0	10	100	35	15	0	0	1	105	10	77.5	32.48	
type 2	50	0	10	100	35	15	0.1	0	0.9	94	10	66.8	14.19	
type 3	50	0	10	100	35	15	0.18	0	0.82	89.2	10	62.7	7.13	
type 4	50	0	10	100	35	15	0.2	0.55	0.25	82.5	10	58.8	0.53	
type 5	50	0	10	100	35	15	0.2	0.8	0	68	10	58.5	0.00	
λ increases by 20 %														***w.r.t λ***
baseline	50	0	10	---	35	15	0.2	0.8	0	---	---	58.5	0	---
type 1	50	0	10	100	35	15	0	0	1	105	12	78.5	34.19	0.26
type 2	50	0	10	100	35	15	0.1	0	0.9	93.8	12	67.6	15.57	0.49
type 3	50	0	10	100	35	15	0.18	0	0.82	88.8	12	63.3	8.28	0.81
type 4	50	0	10	100	35	15	0.2	0.55	0.25	81	12	58.9	0.64	1.00
type 5	50	0	10	100	35	15	0.2	0.8	0	68	12	58.5	0	
Fix m for types 2&4, 3&5														
baseline	50	0	10	---	35	15	0.2	0.8	0	---	---	58.5	0.00	
type 1	50	0	10	100	35	15	0	0	1	105	10	77.5	32.48	
type 2	50	0	10	100	35	15	0.1	0	0.9	92	30	74.9	28.03	
type 3	50	0	10	100	35	15	0.18	0	0.82	85	33.3	70.5	20.54	
type 4	50	0	10	100	35	15	0.2	0.55	0.25	92	2.7	62.6	6.98	
type 5	50	0	10	100	35	15	0.2	0.8	0	85	1	58.5	0	
m increases by 2 %														***w.r.t m***
baseline	50	0	10	---	35	15	0.2	0.8	0	---	---	58.5	0.00	---
type 1	50	0	10	100	35	15	0	0	1	107.1	10	79.6	36.07	---
type 2	50	0	10	100	35	15	0.1	0	0.9	93.8	11.6	67.4	15.30	-22.7
type 3	50	0	10	100	35	15	0.18	0	0.82	86.7	23.9	67.3	15.11	-13.2
type 4	50	0	10	100	35	15	0.2	0.55	0.25	93.8	5.1	66.3	13.40	46.0
type 5	50	0	10	100	35	15	0.2	0.8	0	86.7	1	58.5	0.00	---

Appendix: calculation of the household welfare

Type 1: communal association dominance

Aggregate household welfare is defined by the area below bold dashed line on the Figure 2:

$$HW_1 = u + m - p_c + \frac{\beta + \lambda}{2} \tag{A.1}$$

Change in household welfare compared to the baseline is indicated by the shaded area:

$$\Delta HW_1 = HW_1 - HW = m - (p_c - p_s) + \frac{\lambda}{2} - \frac{(p_s - p_{ns})^2}{2(\beta + \gamma)} \tag{A.2}$$

Type 2: the balanced communal association

Aggregate household welfare is defined by the area below bold dashed kinked line on the Figure 3:

$$\begin{aligned} HW_2 &= \frac{1}{2}\alpha_{ns}^{ii}\left[u - p_{ns} + u^{**}\right] + \frac{1}{2}\left(1 - \alpha_{ns}^{ii}\right)\left[u^{**} + u + m - p_c + \beta + \lambda\right] \\ &= u + m - p_c + \frac{\beta + \lambda}{2} + \frac{(m - (p_c - p_{ns}))^2}{2(\gamma + \beta + \lambda)} \end{aligned}, \tag{A.3}$$

$$\text{where } u^{**} = u - \frac{(\beta + \lambda)p_{ns} + \gamma(p_c - m)}{\beta + \lambda + \gamma} \tag{A.4}$$

Change in household welfare compared to the baseline is indicated by the shaded area:

$$\Delta HW_2 = HW_2 - HW = m - (p_c - p_s) + \frac{\lambda}{2} - \frac{(p_s - p_{ns})^2}{2(\beta + \gamma)} + \frac{(m - (p_c - p_{ns}))^2}{2(\gamma + \beta + \lambda)} \tag{A.5}$$

Type 3: the super safe communal association

Aggregate household welfare is defined by the area below bold dashed kinked line on the Figure 4:

(equals to the *HW₂* in notations, however parameters and market shares are different):

$$\begin{aligned} HW_3 &= \frac{1}{2}\alpha_{ns}^{iii}\left[u - p_{ns} + u^{*}\right] + \frac{1}{2}\left(1 - \alpha_{ns}^{iii}\right)\left[u^{*} + u + m - p_c + \beta + \lambda\right] \\ &= u + m - p_c + \frac{\beta + \lambda}{2} + \frac{(m - (p_c - p_{ns}))^2}{2(\gamma + \beta + \lambda)} \end{aligned} \tag{A.6}$$

Change in household welfare compared to the baseline is indicated by the shaded area (it equals to the ΔHW_2 in notations, however parameters and market shares are different):

$$\Delta HW_3 = HW_3 - HW = m - (p_c - p_s) + \frac{\lambda}{2} - \frac{(p_s - p_{ns})^2}{2(\beta + \gamma)} + \frac{(m - (p_c - p_{ns}))^2}{2(\gamma + \beta + \lambda)} \quad \text{(A.7)}$$

Type 4: the traditional communal association

Aggregate household welfare is defined by the area below bold dashed kinked line on the Figure 5:

$$\begin{aligned} HW_4 &= \frac{1}{2}\alpha_{ns}\left[u - p_{ns} + u^*\right] + \frac{1}{2}\left(\hat{\alpha} - \alpha_{ns}\right)\left[u^* + \hat{u}\right] + \frac{1}{2}\left(1 - \hat{\alpha}\right)\left[\hat{u} + u + m - p_c + \beta + \lambda\right] \\ &= u + m - p_c + \frac{\beta + \lambda}{2} + \frac{(m - (p_c - p_s))^2}{2\lambda} + \frac{(p_s - p_{ns})^2}{2(\beta + \gamma)} \end{aligned}, \quad \text{(A.8)}$$

where $u^* = u - \frac{\gamma p_s + \beta p_{ns}}{\beta + \gamma}$, $\hat{u} = u - \frac{(\beta + \gamma)p_s - \beta(p_c - m)}{\beta + \gamma}$ (A.9, 10)

Change in household welfare compared to the baseline is indicated by the shaded area:

$$\Delta HW_4 = HW_4 - HW = m - (p_c - p_s) + \frac{\lambda}{2} + \frac{(m - (p_c - p_s))^2}{2\lambda} \quad \text{(A.11)}$$

Type 5: the failed communal association

Aggregate household welfare does not change with comparison to the baseline: $HW_5 = HW$;

$\Delta HW_5 = HW_5 - HW = 0$.