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Bobos in paradise: urban politics and the new economy

Gilles Saint-Paul

Abstract

This paper provides some elements to explain the observed takeover in some urban areas of a new kind of elite associated with new economy jobs, also known as ‘bourgeois bohème’ (bobos). This takeover has been associated with greater investment in urban amenities and ‘clean’ means of transport, with adverse effects on commuting time. The model allows us to explain those developments by productivity growth in the new economy, and by the differences in production processes between the new and old economies. The consequences of bobo takeover for house prices and employment of unskilled service workers are also discussed. A bunkerized equilibrium in which skilled workers in the old economy no longer reside in the city and have been replaced by service workers is studied. In such an equilibrium urban amenities are at their maximum and commuting flows have been eliminated. For some parameter values, bobos are better-off under bunkerization, in which case they may gain by favoring it with a ‘diversity’ subsidy for unskilled workers to reside in the city.

JEL H7 R3 R4 R5

Keywords New economy; urban amenities; bobos; residential choice; local public goods; urban voting models; bunkerization

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1 Introduction

The term "bobo" stands for "Bourgeois Bohème" and was coined by David Brooks (2000) in a famous book about the rise of a new knowledge elite. This new kind of bourgeoisie is generally considered as prevalent in globalized capital cities, and its lifestyle and political attitude stand in contrast to that of the traditional bourgeoisie. Furthermore, the bobos are generally viewed as a politically powerful group. They have been instrumental in bringing about left-wing governments in municipalities such as Berlin, Paris or San Francisco, despite the relatively high economic status of this social class.

Economically, the bobos are "symbol manipulators": teachers, intellectuals, professionals, journalists, advertisers, architects, and "connected" workers of the new economy.

In terms of consumption attitudes, the bobos promote a relaxed lifestyle where conspicuous consumption is banned. They seek human scale habitat and a "village" atmosphere, while generally living in large metropolitan areas (an early example of such conceptions is Jacobs (1961)). They insist on environmental quality and promote public transportation or bicycles. They value "arts", in particular in their most modern forms: contemporary arts, rock concerts, and so forth.

Politically, the bobos are viewed as generally supportive of environmentalist and/or socialist parties. Their takeover of major cities has taken place in the context of sharply increasing house prices from the mid-1990s to the onset of the financial crisis, and led to policies that recognizably differ from the ones implemented both by the right and by the traditional left. These policies can be summarized as follows¹:

- Greater investment in collective urban amenities and socialized recreational events.

¹See Brooks (2000), Chapter 7.

- Reduced urban space for the automobile, generally coupled with a reduction in parking space, higher taxes and more stringent regulations and constraints for personal vehicles. More investment in public transportation and in dedicated areas for bicycles and other "clean" means of transportation. Public provision of cheap bike and electrical car rental, and dedication of public space to those devices.
- Promotion of "social mixity" and "diversity", by means of transfer policies and/or subsidized housing that maintain a critical mass of lower class dwellers in the city center, while intermediate classes are eliminated and relocate themselves in the outer periphery².

This paper provides some elements for understanding these developments from a "pure economic perspective". By this I mean that I will attempt to explain them as a consequence of technological developments, instead of just assuming that bobos are a new kind of individuals with their own preferences. The paper focuses on the relative roles of, and conflict of interest between two kinds of bourgeoisie: The skilled workers of the old economy versus the skilled workers of the new economy (bobos)³. The former work in activities that are more land intensive, while still preferring to live in a city centre. As a result they derive more utility from commuting and are less willing to raise commuting costs in order to improve urban amenities than the bobos. The paper shows that as the new economy grows faster than the old economy, the bobos overtake the cadres as the politically decisive group in the city. As a

²See Guilluy (2010), for a discussion of those relocation flows in the French case. See also Clerval and Fleury, 2009, for a discussion of the Paris case.

³These two groups differ in income, in addition to occupation. As will be shown below, in equilibrium the bobos may be a majority in the city even though they earn less than the cadres, provided the gap is not too large. But the analysis equally applies to a situation where the bobos earn more than the cadres, regardless of the size of the gap. That is, the cadres alternatively may be interpreted as an intermediate class, as long as they work in the land intensive sector.

result, the level of urban amenities goes up and so do transportation costs. The consequences for house prices and the cost of services are also studied, as well as the implications for suburban unemployment of the lower classes. House price dynamics in the transition from one regime to another are also studied. It is also shown that the date of this transition is indeterminate, as both regimes may co-exist for a range of productivity levels in the new economy.

Finally, I also show that it may be profitable for the decisive bobo class to subsidize location of lower class unskilled workers in the city, in absence of any altruism toward them or intrinsic taste for a socially diverse makeup of the city. This is because such subsidies allow to force the economy to settle in a "bunkerized" equilibrium in which the service providers to city dwellers are located in the city, so that the price of services no longer goes up with the amenity level. As a result, ex-post there is no cost to raising the amenity level in the city, and the resulting political equilibrium involves the highest possible levels of amenities and transportation costs.

I then discuss data on the evolution of the top 50 French urban areas between 2007 and 2012, looking at variables such as house prices, tramway and bicycle provision, social housing, new economy employment, household service employment, and real estate prices. These data broadly support the model's predictions.

The model is an application of voting equilibrium theory under interjurisdictional mobility, as was studied by Rose-Ackerman (1979), Westhoff (1977), Richter (1982), Epple et al. (1983, 1984), to the specific urban trends that have been observed in the recent decades. It is also related somewhat to the large sociological literature on gentrification pioneered by Glass (1964)⁴.

⁴There are also a number of economic studies of gentrification, like Rossi-Hansberg et al. (2008), Guerrieri et al. (2010), who focus on the geographical spread of increases in land prices following income growth or investment in amenities. This kind of effects is also present in the current model, but the focus is on the politico-economic equilibrium, not

This literature, however, generally fails to identify conflicts of interest within the bourgeoisie, sticking instead with the traditional marxist scheme of class conflict. Instead, I focus on the conflict of interests between two categories of skilled workers that work in different types of occupation. Another relatively unusual aspect of the model is departure from the traditional assumption that all economic activity must take place in the Central Business District, as, say in, Leroy and Sonstelje's (1983) analysis of commuting gentrification. Here the existence of land-intensive economic activities located in the suburbs plays a key role in the analysis.

An illustration of the phenomena analyzed here in the case of Paris is the fate of the so-called "axes rouges". These policies were introduced by Paris mayors Jacques Chirac and Jean Tiberi and consisted in preventing parking along the side of a number of designated large communication ways (such as Avenue Denfert-Rochereau), in order to improve traffic on those axes. In contrast, the socialist Delanoë administration, which took over in 2001, had a deliberate policy of reallocating space away from automobile traffic and in favor of alternative means of transport as well as recreational activities⁵. Consequently, the axes rouges were abolished. It is generally considered that the gentrification process was already well under way under the Chirac and Tiberi administrations. The introduction of axes rouges should therefore be understood as catering to the Parisian upper-middle class voter of that time, and conversely their abolition should be interpreted as a shift in the preferences of the median voter, as analyzed in this paper, not as public policies working toward gentrification.⁶

on gentrification per se.

⁵These policies culminate with the recent plan by Anne Hidalgo, new Paris mayor, to entirely eliminate the automobile from the capital in 2020. For a polemical assessment, see, Roger-Petit (2015).

⁶Clerval and Fleury (2009) document the evolution of the Delanoë administration's urban policies and the differences with the preceding administration. They also show that gentrification had occurred prior to the taking over of the Socialist Party, although they

2 The model

In this section, I lay out the main assumptions of the model. This is a partial equilibrium model of an area with two locations: city and periphery. Unlike the traditional central business district models, economic activity is not constrained to take place in the city⁷.

2.1 Workers and skills

There are three categories of workers:

- Skilled workers specialized in the new economy, thereafter referred to as "Bobos". The total number of bobos is fixed and equal to H_1 . Each of them is endowed with one unit of specialized skilled (type 1) labor.
- Skilled workers specialized in the old economy, that I will refer to as "Cadres"⁸. There are H_2 of them, each endowed again with one unit of (type 2) skilled labor.
- Unskilled workers, called "workers", who are specialized in services. There are L workers in the economy, each endowed with one unit of unskilled labor.

2.2 Goods and production

There are five goods:

also argue that Delanoë's policies reinforced the gentrification process, contrary to his claims.

⁷For the analysis of polycentric cities, see Anas and Kim (1996), Anas et al. (1998) and Okamoto (2007).

⁸This French word loosely means "executive", but it is also associated with a conventional lifestyle with a substantial emphasis on consumer's society, as opposed to the more counter-cultural lifestyle of the bobos. The cadre lifestyle is described to some extent in Barthes (1957), and its somewhat more austere U.S. equivalent is discussed in Brooks (2000), in his analysis of the "Bourgeois" versus the "Bohemians".

- A generic consumption good which is imported, and whose price is normalized to one. This good will be used as the numéraire.
- Two exported goods:
 - A new economy good, good 1, whose production only involves type 1 skills. The production function is

$$y_1 = a_1 h_1,$$

where y_1 is output and h_1 the input of type-1 skill.

- An old economy good, good 2, whose production uses both type 2 skills and land. The production function is

$$y_2 = \min(a_2 h_2, t/b),$$

where t is the land input and h_2 the type 2 skill input. The wage of type 2 labor working in location i is therefore equal to

$$w_2 = a_2(1 - bR_i),$$

where R_i denotes the rental cost of housing in location i .⁹

- Services, denoted by subscript S . These services only use labor. The production function is

$$y_S = a_S l_S,$$

where l_S is the input of labor. Furthermore, in order to supply a service, workers must be physically located in the customer's residential area.

⁹While the assumption that land plays no role in the production of good 1 drastically simplifies the analysis, what really matters is that it is less intensive in land than good 2, and similarly for services.

- Housing: at any time, one unit of land can be converted into one unit of housing at no cost. Therefore, the production function for housing is $y_H = t$, but in practice we will not distinguish between housing and land.

2.3 Geography

There are two areas

- The center (C), or "city", which has a fixed size X in terms of land. I will assume that

$$\max(H_1, H_2) < X < 2 \min(H_1, H_2). \quad (1)$$

This assumption implies that the entire bobo or cadre population may fit in the city, and that if it is the case, the corresponding group will be a political majority. This land is usable for housing or as an input for good 2. In addition to that, a fixed amount of additional land is allocated to public goods, that are divided between urban amenities and transportation infrastructures. As will be clear below, we do not actually need to specify that amount.

- The periphery (P), or "suburb", with an infinite supply of land. In the periphery, there is a fixed, exogenous level of amenities, which is normalized to zero. This allows us, for simplicity, to limit the political economy analysis to the city, which is the focus of the paper.

In the city, public decisions over amenities involve reallocating available space for public goods between amenities and transportation infrastructures. As a result, there is a trade-off between amenities and commuting costs. I

assume that this trade-off is summarized by a positive relationship between ϕ , the level of transportation cost, and α , the amenity level in the city:

$$\phi = \phi(\alpha), \phi', \phi'' > 0.$$

There exists a maximum possible level of amenities α_C . The corresponding commuting cost is $\phi_C = \phi(\alpha_C)$.

2.4 Preferences

There are overlapping generations of agents who live for two periods. Each cohort's size is equal to one. People can borrow and lend at the fixed real international interest rate equal to r . In the first period of their life, people decide where to locate (city vs. suburb), and they purchase housing, if needed, from the preceding generation, at price q_t . Lenders do not live in the city and appropriate the net return to housing. In the second period of their life, people vote on the level of amenities in the city, work, sell their home to the next generation, and consume. All agents have the same utility function, given by

$$\ln c + \beta \ln c_S - \delta \phi + \gamma,$$

where

- c is the consumption of the generic consumption good,
- c_S is consumption of services
- δ is a dummy equal to one if the person commutes and zero if not
- γ if the amenity level, which is equal to α in the city and zero in the suburb.

Furthermore, each individual needs exactly one unit of housing, and therefore of land, so as to survive.

I assume that $\phi'(\alpha_C) > (1+\beta)/\beta$, which, as will be clear below, guarantees an interior equilibrium amenity level in regimes I and II.

Instead of working and consuming, people can instead live in autarky, in which case they get a reservation utility equal to \bar{u} . Also, I will limit the analysis to a regime where the constraint $u \geq \bar{u}$ is binding for workers only. Consequently, only a fraction of the total mass of workers L will be employed, and the others will be "unemployed"¹⁰. An increase in \bar{u} can also be interpreted as an increase in the generosity of welfare benefits.

3 Consumption, production, and location

In this section and the following I describe how to solve for the equilibrium. I will solve the problem in three steps:

1. The consumption and production decisions of all three social classes when old, as a function of their residential location.
2. The locational decisions of the young of the three classes, as a function of expected amenity levels and house prices.
3. The voting decision of urban households on amenities, as a function of the sociological composition of the city.

The equilibrium concept prevailing here is essentially the same as in Epple et al. (1984): there is equilibrium in goods markets, each location is internally in a majority voting equilibrium, and no individual can gain by changing residence.¹¹

¹⁰The unemployed necessarily live in the periphery: they could not afford the housing cost in the city.

¹¹However, here voters (rationally) internalize the effects of electoral outcomes on the resale value of their house, contrary to the assumptions made in Epple et al. (1984). In most of the analysis, though, this is immaterial, because house prices only depend on the expected amenity level in the subsequent period, not on the current amenity level. But

3.1 Consumption and production decisions

In the last period of their life, people consume by maximizing their utility function subject to $c + p_S c_S = y$, where y is their income net of total costs and revenues from housing, and p_S is the price of services in their community, denoted by p in the periphery and by p^* in the city. Therefore, $c = \frac{y}{1+\beta}$ and $c_S = \beta \frac{y}{(1+\beta)p_S}$. Consequently, indirect utility is equal to, up to a constant

$$V(y, p_S, \delta, \gamma) = (1 + \beta) \ln y - \beta \ln p_S - \delta\phi + \gamma$$

Two worker types may potentially be commuters. Workers may commute to offer their service to consumers not located in their area. Cadres may commute to a production site in the other area, as land itself is not moveable.

Table 1 gives us the income when old, net of the rental cost of housing, for the three types of the generation born at t as a function of their residential location and their work location. Note that this does not reflect commuting costs that are incurred as a disutility instead of an income loss. The rental cost of housing in the city for this generation is $R_t = (1 + r)q_t - q_{t+1}$.

Class	Work in city	Work in suburb
Workers in city	$p_t^* a_S - R_t$	$p_t a_S - R_t$
Workers in suburb	$p_t^* a_S$	$p_t a_S$
Bobos in city	$a_1 - R_t$	$a_1 - R_t$
Bobos in suburb	a_1	a_1
Cadres in city	$a_2(1 - bR_t) - R_t$	$a_2 - R_t$
Cadres in suburb	$a_2(1 - bR_t)$	a_2

Table 1: Income

From this, we can compute the utility of each class, which is reported in Table 2.

this effect plays some role when we consider the introduction of "diversity subsidies" in Section 9.

Class	Work in city
Workers in city	$(1+\beta) \ln(p_t^* a_S - R_t) - \beta \ln p_t^* + \alpha$
Workers in suburb	$(1+\beta) \ln(p_t^* a_S) - \beta \ln p_t - \phi$
Bobos in city	$(1 + \beta) \ln(a_1 - R_t) - \beta \ln p_t^* + \alpha$
Bobos in suburb	$(1 + \beta) \ln a_1 - \beta \ln p_t - \phi$
Cadres in city	$(1 + \beta) \ln(a_2 - R_t(1 + a_2 b)) - \beta \ln p_t^* + \alpha$
Cadres in suburb	$(1 + \beta) \ln(a_2(1 - bR_t)) - \beta \ln p_t - \phi$

Class	Work in suburb
Workers in city	$(1 + \beta) \ln(p_t a_S - R_t) - \beta \ln p_t^* + \alpha - \phi$
Workers in suburb	$(1+\beta) \ln(p_t a_S) - \beta \ln p_t$
Bobos in city	$(1 + \beta) \ln(a_1 - R_t) - \beta \ln p_t^* + \alpha - \phi$
Bobos in suburb	$(1 + \beta) \ln a_1 - \beta \ln p_t$
Cadres in city	$(1 + \beta) \ln(a_2 - R_t) - \beta \ln p_t^* + \alpha - \phi$
Cadres in suburb	$(1 + \beta) \ln a_2 - \beta \ln p_t$

Table 2 – Utilities

3.2 Locational decisions

Given those assumptions, a number of configurations may arise regarding the city's sociological composition. I am only going to consider equilibria that satisfy the following characteristics:

1. It is never optimal for cadres to work in the city.

Clearly, this will hold provided b , the land intensity of the old economy technology, is large enough.

2. Workers are at their reservation utility \bar{u} .

For this to hold, it is enough that the supply of workers is large enough.

3. All workers cannot be located in the city.

In equilibrium, it is then clearly optimal for workers in the suburb to provide services there. Otherwise, there would be commuting both ways by workers, which is impossible¹². This pins down the price of services in the

¹²The formulas in Table 2 imply that one would simultaneously have $p > p^*$ and $p^* > p$.

suburbs:

$$\ln p_t = \bar{u} - (1 + \beta) \ln a_S, \quad (2)$$

4. Some city residents are not workers.

In the Appendix, I provide a sufficient condition for conditions 3 and 4 to hold in equilibrium. Finally, I also ignore equilibria where more than one group is located in both areas: that is, groups can be strictly ranked by their marginal willingness to pay to live in the city.

This leaves four possible regimes:

I. All Cadres are in the city (and therefore are a majority), bobos are indifferent between the city and the periphery, and workers live in the suburb

II. All Bobos are in the city, cadres are indifferent between the city and the periphery, and workers all live in the suburb

III. All Bobos are in the city, workers live in the city and periphery, cadres are all in the suburb

IV. All Cadres are in the city, workers are in both locations, and bobos are all in the suburb.

I will first discuss regimes I and II and the transition between the two regimes. Then I will study the specific characteristics of regime III. The analysis of regime IV is left out, because it is less plausible and less relevant to this paper's focus. In particular, as long as bobos are rich enough compared to service workers, they are likely to be willing to pay more to live in the city, and any equilibrium with some workers living in the city must be such that all bobos live there.¹³

In both regime I and regime II, all workers live in the suburb. Part of them commute to offer their services to the city. Workers must be indifferent between that option and that of working in the suburb. Consequently, this

¹³On the other hand, Cadres may be willing to pay less than service workers to live in the city if commuting costs are very high, as is the case in Regime III.

pins down the price of services in the city:

$$\begin{aligned}\ln p_t^* &= \ln p_t + \frac{\phi}{1 + \beta} \\ &= \bar{u} - (1 + \beta) \ln a_S + \frac{\phi}{1 + \beta}.\end{aligned}\tag{3}$$

We also need, in those regimes, that workers be below their reservation utility should they decide to live in the city, i.e.

$$(1 + \beta) \ln(p_t^* a_S - R_t) - \beta \ln p_t^* + \alpha < \bar{u}.$$

4 Equilibrium in Regime I

In Regime I, bobos are indifferent between living in the city and living in the suburb. In either case, they do not pay the commuting cost. Therefore, from Table 2, the following condition must hold:

$$(1 + \beta) \ln(a_1 - R_t) - \beta \ln p_t^* + \alpha = (1 + \beta) \ln a_1 - \beta \ln p_t.$$

Using (3), we find that

$$(1 + \beta) [\ln(a_1 - R_t) - \ln a_1] = -\alpha + \frac{\beta\phi}{1 + \beta}.$$

This determines the rental cost of housing in equilibrium:

$$R_t = a_1 (1 - \exp \lambda(\alpha, \phi)) = R_A\tag{4}$$

where

$$\lambda(\alpha, \phi) = \frac{\beta\phi - \alpha(1 + \beta)}{(1 + \beta)^2}.$$

The $\lambda()$ function captures the net utility cost of living in the city for the bobos, ignoring housing. For this regime to be possible, we need that $\lambda < 0$, i.e.

$$\alpha > \frac{\beta\phi}{1 + \beta}.$$

As implied by (4), house prices are larger, the greater the amenity level and the smaller the commuting cost. The bobos in the city, while not suffering directly from commuting costs, suffer indirectly due to more expensive services in the city. Therefore, the greater the commuting cost, the lower should house prices be in the city. Also, house prices are higher, the greater the bobo's productivity. This captures the effect of income on the willingness to pay for amenities of the bobos, which is reflected in rental costs, since they are the marginal group of city residents.

We now turn to the cadres. Their utility is $(1 + \beta) \ln(a_2 - R_t) - \beta \ln p_t^* + \alpha - \phi$. They set amenities so as to maximize this. This decision is made after they have picked their residence and paid the house price q_t , but before selling back their real estate to the new generation. As long as amenities are not a state variable, q_{t+1} will depend on the amenities set by the next generation. Therefore the amenity level has no effect on q_{t+1} , and hence no effect on R_t . In this model, there are no capital gains associated with investing in greater amenities¹⁴. On the other hand, p^* goes up with transportation costs. Therefore, the cadres set amenities by just maximizing $\alpha - \phi(\alpha) - \beta \ln p_t^*$, or equivalently, given (3), $\alpha - \frac{1+2\beta}{1+\beta} \phi(\alpha)$. Let α_A, ϕ_A be the unique corresponding amenity level and commuting cost. The corresponding utility of the cadres is equal to $(1 + \beta) \ln(a_2 - R_t) - \beta \ln p_t^* + \alpha_A - \phi_A$. For regime I to prevail,

¹⁴This feature greatly simplifies the model but some of the richness of the analysis is lost, as capital gains on real estate disappear as a motivation for investing in amenities. Note that reintroducing them would introduce a conflict of interest between tenants and landowners, and results would be highly sensitive to whether the decisive voter is a tenant or an owner. In the model, while it is assumed that people own their home, their utility only depends on the rental cost of housing and the results would be unchanged if they rented instead.

If amenities were a state variable, then the future amenity level would depend positively on the current one, and investing in amenities would increase the price at which the old generation could resell their homes.

Finally, note that in the analysis of diversity policies below, capital gains play a role, since these policies may irreversibly change the equilibrium regime, thus affecting land prices.

this must be larger than their utility from residing in the suburb, which is equal to $(1 + \beta) \ln a_2 - \beta \ln p_t$. This is equivalent to

$$\frac{a_2}{a_1} > \frac{1 - \exp(\lambda_A)}{1 - \exp(\mu_A)} = z_A > 1, \quad (5)$$

where

$$\begin{aligned} \lambda_A &= \lambda(\alpha_A, \phi_A), \\ \mu_A &= \frac{(1 + 2\beta)\phi_A - \alpha_A(1 + \beta)}{(1 + \beta)^2} = \mu(\alpha_A, \phi_A) > \lambda_A. \end{aligned}$$

We note that $a_2(1 - \exp(\mu_A))$ is the cadre's willingness to pay for living in the city. The $\mu()$ function is the net utility cost of residing in the city for the cadres, ignoring housing costs. Since the cadres, unlike the bobos, have to commute, we have that $\mu(\alpha, \phi) > \lambda(\alpha, \phi)$ for all α, ϕ . Equation (5) therefore states that in regime I, this quantity is larger than the cost of housing, itself equal to the bobos willingness to pay for living in the city.

It is also interesting to compute the employment level in the service sector. Denoting by R_A the rental cost of housing in this regime, total income in the city is

$$Y_C = a_2 H_2 + a_1 (X - H_2) - R_A X.$$

Total service demand in the city is therefore equal to

$$C_{SC} = \beta \frac{a_2 H_2 + a_1 (X - H_2) - R_A X}{(1 + \beta) p^*}.$$

Therefore, the number of service workers who work in the city (but live in the periphery) is

$$\begin{aligned} L_C &= \beta \frac{a_2 H_2 + a_1 (X - H_2) - R_A X}{(1 + \beta) p^* a_S} \\ &= \beta \frac{a_2 H_2 + a_1 (X - H_2) - R_A X}{(1 + \beta) p a_S} \exp\left(-\frac{\phi_A}{1 + \beta}\right) \\ &= L_C^A. \end{aligned}$$

In the periphery, the demand for services comes from the working class and the bobos who live there. Their combined income is

$$Y_P = a_1(H_1 + H_2 - X) + p^*a_S L_C + pa_S L_P,$$

where L_P denotes the unskilled employment level in the periphery. Again we must have $L_P = \frac{\beta}{1+\beta} \frac{Y_P}{a_S p}$, yielding

$$\begin{aligned} L_P &= \frac{\beta}{pa_S} \left[\frac{\beta}{1+\beta} (a_2 H_2 + a_1 (X - H_2) - R_A X) + a_1 (H_1 + H_2 - X) \right] \\ &= L_P^A. \end{aligned}$$

It is easy to see that $\partial(L_P^A + L_C^A)/\partial a_1 > 0$, although the rise in house prices associated with an increase in the new economy's productivity may well lead to a reduction in services consumption in the city.

These derivations allow us to summarize the main properties of Regime I:

- An equilibrium in regime I prevails if $\frac{a_2}{a_1}$ is larger than a critical threshold, which is itself greater than 1. Other things equal, bobos are willing to pay more to live in the city than cadres, because the former do not have to commute. Therefore, for cadres to dominate in the city, their income must be larger than that of the bobos by a sufficient margin.
- In regime I, the cost of housing goes up with productivity in the new economy sector.
- In regime I, employment of unskilled workers goes up with productivity in the new economy.

5 Regime II

Let us now turn to Regime II. The indifferent social group in residential choice is now the cadres, while the bobos are politically pivotal. The indifference condition for the cadres reads

$$(1 + \beta) \ln(a_2 - R_t) - \beta \ln p_t^* + \alpha - \phi = (1 + \beta) \ln a_2 - \beta \ln p_t \quad (6)$$

House rental costs are now equal to

$$R_t = a_2 (1 - \exp \mu(\alpha, \phi)) = R_B. \quad (7)$$

For this regime to be possible, we need that $\mu < 0$, i.e.

$$\alpha > \frac{1 + 2\beta}{1 + \beta} \phi.$$

The utility of the bobos is $(1 + \beta) \ln(a_1 - R_t) - \beta \ln p_t^* + \alpha$. They maximize $-\beta \ln p_t^* + \alpha$, or equivalently $\alpha - \beta \phi(\alpha)/(1 + \beta)$. Let α_B, ϕ_B be the corresponding amenity level and commuting cost. The corresponding utility of the bobos is, in steady state, equal to $(1 + \beta) \ln(a_1 - R_t) - \beta \ln p_t^* + \alpha_B$. For regime II to prevail, this must be larger than their utility from residing in the suburb, which is equal to $(1 + \beta) \ln a_1 - \beta \ln p_t$. This is equivalent to

$$\frac{a_2}{a_1} < \frac{1 - \exp(\lambda_B)}{1 - \exp(\mu_B)} = z_B > 1, \quad (8)$$

where¹⁵

$$\lambda_B = \lambda(\alpha_B, \phi_B),$$

$$\mu_B = \mu(\alpha_B, \phi_B) > \lambda_B$$

¹⁵Again, this inequality means that the bobo's WTP, $a_1(1 - \exp(\lambda_B))$, exceeds the cost of housing, $a_2(1 - \exp(\mu_B))$.

We have the following Lemma:

Lemma 1 – $\lambda_A > \lambda_B$ and $\mu_B > \mu_A$.

Corollary – $z_B > z_A$

This corollary implies that there may be multiple equilibria¹⁶. Expecting to win the election makes it more valuable for the winning group to locate in the city, as they get an amenity level closer to their preferences. Therefore, that expectation is to some extent self-fulfilling.

Finally, we can compute unskilled employment as in the preceding section:

$$L_C^B = \beta \frac{a_1 H_1 + a_2 (X - H_1) - R_B X}{(1 + \beta) p a_S} \exp\left(-\frac{\phi_B}{1 + \beta}\right)$$

$$L_P^B = \frac{\beta}{p a_S} \left[\frac{\beta}{1 + \beta} (a_1 H_1 + a_2 (X - H_1) - R_B X) + a_2 (H_1 + H_2 - X) \right]$$

We note that in this regime, house prices are independent of productivity in the new economy. On the other hand, productivity in the new economy has a positive effect on service employment (since $dL_C^B/da_1 > 0$ because of demand effects, and $dL_P^B/da_1 > 0$ because of the positive spillovers on the periphery of the additional service workers hired by the bobos in the city).

6 Comparing regime II with regime I

I now establish a number of results regarding the comparison between the two regimes¹⁷.

¹⁶This multiplicity issue is recognized in Epplé et al. (1984) and Westhoff (1977).

¹⁷All proofs are in the Appendix.

Proposition 1 – Amenities, and therefore commuting costs and the price of services in the city, are larger in regime II.

This result is straightforward: As the bobos do not have to commute, they incur a lower cost from increasing amenities. Therefore they vote for a greater amenity level.

Proposition 2 – House prices are larger in regime II if and only if

$$\frac{a_2}{a_1} > \frac{1 - e^{\lambda_A}}{1 - e^{\mu_B}} = \tilde{z} \in [z_A, z_B]$$

House prices may go up as the bobos take over, because amenities make living in the city more desirable. But, at the same time, the cadres become the marginal buyers of land and they suffer from the excess level of amenities and transportation costs. The political takeover of the bobos would increase house prices if the cadres are rich enough compared to the bobos at the time of a transition from regime I to regime II.

The model does not systematically validate the naive view that more amenities would increase house prices, since in regime II the marginal city dwellers suffer from greater commuting costs, that are the price to be paid for raising the amenity level. This prediction stands in contrast to what would be expected from a central business district model where all economic activity takes place in the city.

We can also compare the employment levels of unskilled workers in the two regimes. The preceding formulas highlight that there are three effects:

- The price of services is higher in the city in the regime where the bobos are politically decisive. This tends to reduce the demand for services and unskilled employment. Essentially, greater commuting costs are similar to a negative productivity shock affecting the service sector.

- If the cost of housing (R) is larger in regime II than in regime I, this depresses the demand for services in the city. The converse holds if the cost of housing actually falls in regime II compared to regime I.¹⁸
- In regime II, the bobos who live in the suburbs are replaced by cadres. In the zone where a switch may occur, the latter are richer than the former. The cadres who live in the suburb instead of the city consume more services than the bobos they have replaced. The bobos who live in the city instead of the suburb consume fewer services than the cadres they have replaced. But, because services are more expensive in the city, the former effect is stronger than the latter. On net, therefore, this change in the suburban bourgeois population tends to raise service employment.

Despite those ambiguities, we can get a sufficient condition for service employment to be lower in regime II than in regime I:

Proposition 3 – Assume that

$$\phi_A < -(1 + \beta) \ln(1 - \beta).$$

and

$$R_B > R_A$$

Then at the margin of a transition from regime I to regime II,

$$L_P^B + L_C^B < L_P^A + L_C^A.$$

Therefore, if a transition from regime I to regime II is associated with higher housing costs and if the initial amenity level picked by the cadres in the city is low enough, such a transition is harmful for the employment of unskilled service workers.

¹⁸Note that these interest payments accrue to the rest of the world. An increase in house prices would be financed by a capital inflow, i.e. a trade deficit.

7 The rise of the new economy and the transition from regime I to regime II

In this section I discuss the effect of an expected bobo takeover on house price dynamics.

Suppose that, due to the progress of the new economy, a_1 rises over time, while a_2 remains constant. Then the preceding analysis implies that at some stage, the composition of the city will change: the economy will shift from regime I to regime II. However, due to multiple equilibria, the date of the transition cannot be predicted. During the period such that $a_2/a_1 \in [z_A, z_B]$, multiple transitions in both directions may even occur. To simplify the analysis, let us plausibly assume that there is a unique transition date T . Therefore, the economy is in regime I before T and in regime II after.

The rental cost of housing keeps going up until date T , and stabilizes thereafter. As for house prices, before date T they evolve according to

$$q_t = \frac{1}{1+r} (q_{t+1} + a_{1t}(1 - e^{\lambda_A})),$$

since $R_t = a_{1t}(1 - e^{\lambda_A})$. We can show that house prices go up monotonically in the run-up to the bobo's takeover, provided the transition does not occur too late:

Proposition 4 – Assume

$$a_{1T-1} < a_2 \frac{1 - e^{\mu_B}}{1 - e^{\lambda_A}}, \tag{9}$$

then q_t is monotonically increasing with time for $t \leq T$, and constant thereafter.

Condition (9) means that house prices are higher after the transition than before, which, given that a_1 is growing over time, is a weaker condition than for house prices to be higher in regime II than in regime I.

From Proposition 4 we may conclude that growth in the new economy will generate an upward trend in house prices, but that it should stop once the bobo takeover is complete and once they have completed their investments in urban infrastructure. However, as we are going to see, this levelling off of house prices only takes place if the city does not become bunkerized.

8 The bunkerized equilibrium (regime III)

In this section I characterize an equilibrium in regime III, where only workers and bobos live in the city, the latter being all located there and therefore being a political majority, and cadres are all in the suburb. Such a regime is likely to exist, for the following reason: if workers are initially located in the city, and are numerous enough to be the sole providers of services in that community, then, contrary to regimes I and II, an increase in commuting costs no longer raises the price of services in the city. This will induce city residents to elect the highest possible level of amenities, making it very costly for the cadres to locate in the city ex-ante and commute to work¹⁹. In such a regime, the city becomes bunkerized, in that no commuting takes place between the city and the periphery.

Let us now characterize this regime. I will limit the analysis to the zone where a regime II equilibrium also exists, i.e. $a_1 > a_2/z_B$.

8.1 Equilibrium determination and properties

First, it must be that workers are indifferent between locating in the city and the periphery. We assume (and will check that it holds in equilibrium), that

¹⁹One also has to check that working in the city delivers too low a wage for the cadres, as captured by Proposition 5, condition iv.

workers do not commute. Therefore, we have from Table 2 that

$$\begin{aligned}\bar{u} &= (1 + \beta) \ln(p_t^* a_S - R_t) - \beta \ln p_t^* + \alpha \\ &= (1 + \beta) \ln(p_t a_S) - \beta \ln p_t.\end{aligned}\tag{10}$$

The price of services in the suburbs is still determined by (2). However, the price of services in the city is determined by a local equilibrium between supply and demand. Total city income is

$$Y_C = a_1 H_1 + p_t^* a_S (X - H_1) - X R_t.$$

Equilibrium in the service market in the city is such that

$$S^d = \frac{\beta}{1 + \beta} \frac{Y_C}{p_t^*} = S^s = a_S (X - H_1).$$

Rearranging, we get that

$$R_t = a_1 \frac{H_1}{X} - \frac{a_S}{\beta} p_t^* \left(1 - \frac{H_1}{X}\right).\tag{11}$$

This defines a downward sloping relationship between R and p^* , labeled SME. The greater the cost of housing, the lower the city dwellers' purchasing power, and the lower the equilibrium price of services.

It can be checked that Equation (10) defines a positive relationship between p^* and R , representing equilibrium in the housing market (HME). The greater p^* , the greater the incentives for workers to locate in the city, and the higher the equilibrium rental cost of housing. As illustrated on Figure 1, the two relationships HME and SME uniquely determine the equilibrium values of R and p^* . I will label these values R_C and p_C^* .

An increase in the productivity of the new economy (Figure 2) shifts SME up and leads to an increase in the price of services and in the cost of housing; part of the rise in the bobos' purchasing power is spent on services, which raises their price and attracts new workers to the city. These workers bid the

price of housing up, to the point where they are again indifferent between locating in the city and in the periphery. Note that this response stands in contrast to that of regime II, where the price of services was insulated from the bobo's income due to commuting of workers from the suburbs, and the price of housing also did not depend on the bobo's income because it was pinned down by productivity in the old economy, due to the cadres being the marginal city dwellers.

Furthermore, in the bunkerized regime an increase in a_1 has no effect on service employment, contrary to regimes I and II. Service employment in the city is constrained by available space (there are $X - H_1$ housing units left for the workers), and service employment in the suburb is determined by the cadre's income, which is independent of a_1 .

An increase in the amenity level α shifts HME up: workers have a greater incentive to locate to the city, which bids rents up, eventually depressing the demand for, and prices of services. It should be stressed that this should be an *expected* increase in α , as housing has to be purchased before the utility from amenities is incurred.

What amenity level will the bobos choose? Again, given our timing of events, this choice does not affect q_{t+1} . While its expectation was already priced in q_t , the current choice of α does not affect q_t either, since it takes place after the preceding period's housing market. Nor does α affect p_t^* , since the supply of services is frozen by the locational decisions of service workers made at t . Therefore, the bobos will simply maximize α and pick the highest possible level of amenities α_C , so that $\phi = \phi_C$.²⁰

Proposition 5 in the Appendix provides precise necessary and sufficient condition for a regime III equilibrium to exist. I now discuss its properties

²⁰As discussed in footnote 21, for high values of a_1 regime III is replaced by regime IIIB where not all bobos live in the city, and where workers may even be a political majority. Since the workers do not commute, in such a regime they will choose the same (maximum) level of α as in regime III.

using a numerical example.

8.2 A numerical example

Given that we cannot get a closed form solution for p^* and R , I compute a numerical solution for the bunkerized equilibrium, checking that all the conditions in Proposition 5 hold. The key variables of interest are reported in Figures 3-5, as a function of a_1 . The range of values for a_1 is such that equilibria in both regimes II and regime III exist – below this range, an equilibrium in regime II does not exist since (8) is violated, and above this range, the simulations indicate that condition (ii) above is violated, meaning that house and service prices become so high that bobos prefer to live in the periphery²¹. The parameter values corresponding to those figures are $X = 1, H_1 = H_2 = 0.7, \bar{u} = -2, a_S = 1, a_2 = 1.5, \beta = 1, \phi(\alpha) = \alpha^4$, and I impose a maximum value of $\alpha = 5$ (which will hence prevail in regime III, along with a very high transportation cost $\phi = 625$).

Figure 3 plots the rental cost of housing as a function of a_1 , while Figure 4 reports the price of services. As a comparison benchmark, their corresponding values for regime II are plotted too. As proved above, both p^* and R go up with a_1 . Furthermore, both are well above their regime II counterpart for the whole range of values of a_1 . This is relatively intuitive: the very high level of amenities that is voted for in regime III makes it highly desirable to reside in the city, as long as one does not commute; and services are relatively scarcer in regime III because they cannot be imported from the periphery.

²¹One can check that an equilibrium, labelled Regime IIIB, with two indifferent groups then arises, as not all the bobo population lives in the city. Services prices are so high that the property that bobos are willing to pay more to live in the city than workers no longer holds. Regardless of the mix between workers and bobos in the city, the amenity level will be set at its maximum, since neither bobos nor workers commute.

The conditions that characterize Regime IIIB are briefly discussed in the Appendix.

Figure 5 compares the bobo's utility between the two regimes. We see that for relatively low levels of a_1 , the bobos are better-off in the bunkerized equilibrium: despite higher land and service prices, they enjoy a greater amenity level. If a_1 is high, however, amenities are no longer sufficient to compensate the bobos for the greater prices of services and housing in the bunkerized equilibrium (and for even higher level the bobos are better-off in the periphery and regime III ceases to exist).

9 "Diversity"

In this section I illustrate how the model may be useful to understand the reason why a city politically dominated by bobos may want to subsidize lower class service workers for residing in the city. Based upon the preceding discussion, we may think of a number of economic mechanisms through which such subsidies may raise the utility of the bobos:

1. If amenities and commuting costs are high, bringing the workers in the city may reduce urban service prices²². Intuitively, this effect alone should not be enough to make it rational to subsidize service workers. Absent an externality, taxing oneself to subsidize a good cannot improve welfare.

2. If, contrary to the assumptions made above, the bobos were not numerous enough to capture political power, the presence of non-commuting workers in the city might help them build a coalition in favor of high amenities/high commuting costs.

3. A subsidy for workers to reside in the city may force the equilibrium to be in regime III, that is, it could eliminate an equilibrium in regime II. This may be profitable for the bobos whenever the bunkerized equilibrium delivers a higher utility to them.

²²This is a complementarity in consumption between skilled and unskilled workers; see Bénabou (1993) for an analysis of the role of production complementarities in the urban make-up of a city.

4. By triggering a shift from a low amenity to a high amenity equilibrium, such subsidies may raise house prices, thus delivering capital gains to the incumbent generation of old city dwellers – indeed, we have seen that house prices are higher in regime III than in regime II. Interestingly, this effect affects all incumbent residents, including the cadres.²³

The mechanism described in point 3 can easily be analyzed within the context of the model, provided we assume that there is some way for the bobo caste as a whole to commit over such a tax policy. Let us assume that any young working class person is paid a subsidy s to reside in the city, and that this subsidy is financed by a tax τ levied on the bourgeois young. Let us assume that a_1 is high enough to rule out a regime I equilibrium. For a regime II equilibrium to exist, it must be that the young working class are not better-off living in the city, i.e.²⁴

$$(1 + \beta) \ln(p_B^* a_S - R_B + s(1 + r)) - \beta \ln p_B^* + \alpha_B < \bar{u}.$$

This defines a maximum subsidy level beyond which regime II ceases to exist, which, given (2) and (3), is equal to

$$s_{\min} = \frac{R_B - e^{\bar{u}} a_S^{-\beta} (e^{\frac{\phi}{1+\beta}} - e^{-\frac{\alpha_B}{1+\beta}} e^{\frac{\beta\phi}{(1+\beta)^2}})}{1 + r}.$$

If $s > s_{\min}$ the economy cannot be in regime II, and a regime III equilibrium is determined by the HME and SME conditions, the former being modified to take the subsidy into account:²⁵

$$(1 + \beta) \ln(p_C^* a_S + (1 + r)s - R_C) + \alpha_C - \beta \ln p_C^* = \bar{u}. \quad (12)$$

²³In the numerical simulation reported below, this holds even in the case where the subsidy is financed by a tax on the old.

²⁴If such an equilibrium exists, it has the same values of α , R and p^* as in Section 5, since the tax τ is equal to zero, as no worker takes advantage of living in the city.

²⁵The SME condition is unchanged as the transfer from skilled workers to unskilled one has no effect on the demand for services, given homothetic preferences.

Clearly, an increase in s shifts HME up, raising housing costs and reducing service prices. This will harm bobos²⁶. However, they may benefit from a subsidy slightly above s_{\min} if it is believed that the economy would be in regime II absent such a subsidy. For this to be the case it must be that their utility is higher in regime III under $s = s_{\min}$ than in regime II, that is

$$(1+\beta) \ln(a_1 - R_C - \tau_{\min}(1+r)) - \beta \ln p_C^* + \alpha_C > (1+\beta) \ln(a_1 - R_B) - \beta \ln p_B^* + \alpha_B, \quad (13)$$

where $\tau_{\min} = s_{\min} \frac{X-H_1}{H_1}$ is the tax rate associated with the minimum subsidy, given the city's budget constraint.

I have checked that condition (13) holds for the parameter values used in the simulations of Section 8.2, for $a_1 \leq 4.45$. This is only slightly below the value of a_1 for which the two equilibria yield the same utility to bobos absent a subsidy (see Figure 5), because the subsidy level which eliminates regime II turns out to be relatively small.

The subsidy allows the bobos to change the sociological make-up of the city, which in turn allows them to implement a high level of amenities and commuting costs, while the pool of service workers who are located in the city because of the subsidy prevents service prices from becoming prohibitively high in response to bunkerization. In this multiple equilibrium world, taxing oneself to subsidize others works because it allows to enforce a more favorable equilibrium.

²⁶Their disposable income falls because of greater taxes and higher house prices. As they spend a constant income share on each good, they must consume less of the generic good. In equilibrium, they consume the same amount of services, while the amenity level is unchanged and equal to its maximum. On net, therefore, their utility must fall.

10 Evidence from French cities

In this section I provide some supportive evidence for the model. I use data for 49 of the 50 largest French urban areas²⁷, which allow to study the evolution of urban transportation amenities, the sectoral composition of employment, house prices, the fraction of the population in subsidized housing, and the political orientation of the ruling municipal council²⁸. I focus on the 2008-2012 period, which follows the 2008 municipal elections.

The preceding analysis shows that investment in urban amenities tends to be larger, the greater the political power of workers in the new economy, i.e. the greater the initial fraction of those workers. Furthermore, bunkerization is associated with positive comovements between amenities, subsidized housing, service employment and house prices; and to the extent that bunkerization is more likely to arise under bobo incumbency, in that regime we also expect to observe a greater than average initial fraction of employment in the new economy. Finally, conventional wisdom suggests that bobo power is associated with a left-wing municipality, although actual outcomes depend on the nature of electoral competition: If platform convergence arises as in Downsian competition, right-wing municipalities will also pursue those policies.

In order to test those predictions, I split my sample into three groups, using an aggregate index of transportation amenities. I have data for two types of amenities: tramways ("tram") and public self-service rental bicycles ("vélib"). Both types of investment were explicitly associated with the goal of reducing the scope of car travel in urban areas. For example the Paris tramway is a substitute for a former bus line (the "petite ceinture"), but was built in order to reduce the number of entry points for cars into down-

²⁷The city of Annemasse was dropped from the sample, as it is generally considered as part of the Geneva urban area.

²⁸See Appendix 2 for data sources.

town Paris²⁹. Similarly vélib's are associated with a massive reconversion of parking space into vélib delivery spots, and of car transit lanes into bicycle lanes. Overall, while these policies introduce more "ecological" means of transportation, it is plausible to assume that they tend to have adverse effects on commuting costs.

I can compute the increase in the number of tramway lines between 2007 and 2012, denoted by *TRAM*; I can also construct a dummy equal to 1, called *VELIB*, if the city introduces vélib's between 2007 and 2012. For any given value of α , I can construct an aggregate amenity index equal to

$$AMEN(\alpha) = VELIB + \alpha TRAM.$$

Groups I, II, and III are then defined as the upper, middle and bottom thirds of the ranking of cities by $AMEN(\alpha)$.³⁰ Although the assignment to each group is exogenous, due to the relatively small number of observations, we could loosely think of group I being in regime III, group II in regime II, and group III in regime I.

Table 3 reports the mean values of the variables of interests, for $\alpha = 0.1$. The ranking and results turn out to be quite robust to the choice of α , for $\alpha \in [0.1, 9]$.³¹

²⁹See, "Tramway à Paris: Delanoë est-il l'ennemi de la voiture?", *L'Express*, december 15 2012, http://www.lexpress.fr/actualite/politique/tramway-a-paris-delanoe-est-il-l-ennemi-de-la-voiture_1199483.html

³⁰Because many cities share the same values for $AMEN(\alpha)$, however, and because it does not make sense to assign cities with the same value to different groups, the resulting groups turn out to have different sizes. In particular, the bottom group is reduced to all cities for whom $AMEN(\alpha)$ is equal to zero, while a large set of cities with equal scores equal to the threshold for the top third has to be assigned to group II, otherwise that group would only have three cities. As a result, group I has 11 cities.

A two-group decomposition has also been tried, with similar results.

³¹Only three cities change categories when comparing the assignment for $\alpha = 9$ to $\alpha = 0.1$: Brest, Le Mans and Reims which all move from group II to group I.

Variable	Average group I	Average group II	Average group III	p-value
HLM	0.5 (0.4)	-0.2 (0.2)	-0.1 (0.4)	0.27
Service employment	0.54 (0.1)	0.53 (0.06)	0.34 (0.15)	0.49
Left	0.63 (0.15)	0.75 (0.1)	0.61 (0.1)	0.64
New economy	9.5 (0.9)	8.5 (0.7)	6.4 (0.3)	0.002
NE execs	50.1 (2.1)	48.9 (1.7)	44.5 (1.3)	0.03
House prices	3.8 (2.6)	1.3 (1.9)	-3.0 (1.8)	0.09

Table 3 – Average values of economic variables by amenity groups. The last column is the p-value for an ANOVA test of equality between those averages. Standard errors in parentheses. HLM = Increase in population share in subsidized housing, 2007-2012, %. Service employment – Increase in the share of population in services to households, 2007-2012, %. Left – Dummy for left-wing municipality in 2007. New economy – Share of total employment in the new economy, as defined by the following industries: Culture, leisure, conception, research, intellectual services; %, 2007. NE Execs – Share of total employment in the new economy, as defined in the preceding industries, among executives. House prices – Increase in area house prices, %, 2007-2012

The numbers in Table I are overall supportive of the model, although not all differences are statistically significant. Cities that invested more in amenities after the 2008 elections tend to be those with a greater fraction of workers in the new economy, either in the workforce at large or among highly skilled workers, and experienced stronger growth in house prices thereafter. They are also more likely to have raised the fraction of households in social housing ("HLM") and to have more service employment, in accordance with the above discussion on bunkerization. However, taken individually, these latter differences are not statistically significant. Finally, a large increase in the amenity level does not seem to be especially related to a left-wing municipality. This is consistent with the Downsian prediction of platform convergence. Indeed, the 2014 campaign of the right-wing contender for the Paris municipality, Nathalie Kosciusko-Morizet, was fully supportive of the

policies that are generally associated with the Bobo establishment³².

11 Conclusion

This paper has shown that one can explain some recent trends in urban sociology and policies without referring to an evolution of the preferences of the decisive voters in the city, regarding urban amenities, transportation infrastructure, and housing subsidies for the lower class. Rather, these trends can be explained by productivity growth in the new economy goods relative to other sectors, along with the specificity of the production process for those goods. Of course, as documented by the original book by Brooks, preferences may matter in other dimensions (such as consumption of organic food or specific details of home interior decoration) that are not treated by the model analyzed here. It is possible, though, that these aspects of the new urban elite's lifestyle also are a consequence of their economic characteristics, especially if one allows for endogenous preferences. This is a productive avenue for further research.

³²See "The harpist or the heiress? Image is all in the race to be first woman mayor of Paris", *The Guardian*, March 2 2014, in which it is stated that "[Nathalie Kosciusko-Morizet] was photographed using a free Vélib' bicycle(...)."

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APPENDIX I: Proofs

Ruling out a configuration where all service workers are in the city – We prove that a sufficient condition for ruling out such an outcome is³³

$$\bar{u} - \beta \ln a_S < \min(\ln a_1, \ln a_2). \quad (14)$$

To see this, assume such a configuration holds. Then from Table 2 we know that workers in the city provide services to both the city and the suburb, i.e.

$$\bar{u} = (1 + \beta) \ln(pa_S - R) - \beta \ln p^* + \alpha - \phi, \quad (15)$$

$$\bar{u} = (1 + \beta) \ln(p^*a_S - R) - \beta \ln p^* + \alpha. \quad (16)$$

Clearly, from these conditions, we must have that $p > p^*$.

In such an equilibrium it must be that the workers get less than \bar{u} in the suburb, i.e.

$$\bar{u} > (1 + \beta) \ln(pa_S) - \beta \ln p \quad (17)$$

. From (15) it follows that

$$(1 + \beta) \ln \frac{pa_S - R}{pa_S} > \beta \ln \frac{p}{p^*} + \phi - \alpha.$$

³³In the bunkerized equilibrium that is characterized below, cadres cannot overbid workers for living in the city, because of the very high commuting they would have to incur. In an equilibrium where *all* workers are located in the city, however, they must also be commuting to the periphery, and it is enough for cadres to be richer than them to be able to underbid them.

Also note that the condition is *more* likely to be satisfied, the *more productive* the unskilled workers. Because services are nontraded and the supply of service workers is infinitely elastic, an increase in a_S reduces the price of services more than proportionally, making it easier for the two other classes to be richer. On the other hand, the skilled workers' income always goes up with their productivity, as they produce a traded good.

Given (1), we also need that either the cadres or the bobos are better-off in the suburb than in the city. Using Table 2, we see that bobos prefer to be in the city provided

$$(1 + \beta) \ln(a_1 - R) - \beta \ln p^* + \alpha > (1 + \beta) \ln a_1 - \beta \ln p.$$

For this to be violated, it must be that

$$(1 + \beta) \ln \frac{a_1 - R}{a_1} \leq \beta \ln \frac{p}{p^*} - \alpha < (1 + \beta) \ln \frac{pa_S - R}{pa_S} - \phi.$$

Since $\phi > 0$, it must be that

$$a_1 \leq pa_S. \tag{18}$$

Using the same steps, we can show that for the cadres not to strictly prefer the city, we need that

$$a_2 \leq pa_S. \tag{19}$$

From (17) we have that

$$\ln p < \bar{u} - (1 + \beta) \ln a_S.$$

This inequality implies that if (14) holds, both (18) and (19) are violated. It must then be that all cadres and all bobos live in the city, which contradicts assumption (1).

Ruling out a configuration where all city residents are service workers – If that is the case, clearly some city residents must commute to supply their services to the suburb, since total city demand for services is lower than total city supply. Consequently, we must have that

$$(1 + \beta) \ln(pa_S - R) - \beta \ln p^* + \alpha - \phi = \bar{u}.$$

At the same time, city residents cannot get strictly more than \bar{u} by supplying services locally:

$$(1 + \beta) \ln(p^* a_S - R) - \beta \ln p^* + \alpha \leq \bar{u}.$$

From these two conditions it must clearly be that case that

$$p^* < p.$$

Consequently, suburban workers do not commute to the city. Then services in the city are supplied locally, implying

$$(1 + \beta) \ln(p^* a_S - R) - \beta \ln p^* + \alpha = \bar{u}.$$

Since the LHS is an increasing function of p^* , and since $p > p^*$, it follows that

$$(1 + \beta) \ln(pa_S - R) - \beta \ln p + \alpha > \bar{u} = (1 + \beta) \ln(pa_S) - \beta \ln p. \quad (20)$$

Furthermore, bobos cannot be strictly better-off in the city:

$$(1 + \beta) \ln(a_1 - R) - \beta \ln p^* + \alpha < (1 + \beta) \ln a_1 - \beta \ln p.$$

Since $p^* < p$, it must then be that

$$(1 + \beta) \ln(a_1 - R) - \beta \ln p + \alpha < (1 + \beta) \ln a_1 - \beta \ln p. \quad (21)$$

For (20) and (21) to simultaneously hold, it must be that $a_1 < pa_S$, or equivalently

$$\ln a_1 < \bar{u} - \beta \ln a_S.$$

But this contradicts (14).

Proof of Lemma 1 – The optimization problem of the pivotal voter in each regime implies that $\mu(\alpha, \phi)$ is minimum in regime I, while $\lambda(\alpha, \phi)$ is minimum in regime II.

Proof of Proposition 1 – in regime II, the bobos set α and ϕ so as to maximize $\alpha - \beta\phi(\alpha)/(1 + \beta)$. In regime I, the cadres maximize $\alpha - \frac{1+2\beta}{1+\beta}\phi(\alpha)$.

Proof of Proposition 2 – Straightforward from the expression of house prices and the fact that $\mu_B > \mu_A > \lambda_A > \lambda_B$.

Proof of Proposition 3 – We have that, using the derivations in the preceding sections,

$$\begin{aligned} L_P^B + L_C^B - (L_P^A + L_C^A) &\propto (a_2 - a_1)(H_1 + H_2 - X)(1 - \beta - e^{-\frac{\phi_A}{1+\beta}}) \\ &\quad + X(R_A - R_B) \left(\beta + e^{-\frac{\phi_A}{1+\beta}} \right) \\ &\quad + Z_B(e^{-\frac{\phi_B}{1+\beta}} - e^{-\frac{\phi_A}{1+\beta}}), \end{aligned}$$

where

$$Z_B = a_1 H_1 + a_2(X - H_1) - R_B X > 0.$$

Clearly, $a_2 > a_1$ since both regimes must exist for the transition to occur. Since one also has $\phi_B > \phi_A$, all terms above are negative under the assumptions of the Proposition. QED.

Proof of Proposition 4 – Clearly, for $t \geq T$, we have that $q_t = R_B/r = a_2(1 - e^{\mu_B})/r$. Furthermore, $q_{T-1} = \frac{a_{1T-1}(1 - e^{\lambda_A})}{1+r} + \frac{R_B}{r(1+r)}$. This is clearly lower than R_B/r if (9) holds. Furthermore, we have that

$$q_{t+1} - q_t = \frac{q_{t+1}r - a_{1t}(1 - e^{\lambda_A})}{1+r}.$$

We now show that this quantity is positive. Note that for $t \leq T - 2$

$$\begin{aligned} r q_{t+1} &= r \sum_{s=t+1}^{T-1} \frac{a_{1s}(1 - e^{\lambda_A})}{(1+r)^{s-t}} + \frac{R_B}{(1+r)^{T-t-1}} \\ &> a_{1t}(1 - e^{\lambda_A}) \left(1 - \frac{1}{(1+r)^{T-1-t}} \right) + \frac{a_{1T-1}(1 - e^{\lambda_A})}{(1+r)^{T-1-t}} \\ &> a_{1t}(1 - e^{\lambda_A}) \left(1 - \frac{1}{(1+r)^{T-1-t}} \right) + \frac{a_{1t}(1 - e^{\lambda_A})}{(1+r)^{T-1-t}} \\ &= a_{1t}(1 - e^{\lambda_A}). \end{aligned}$$

This proves that $q_{t+1} > q_t$. QED.

Conditions for a bunkerized equilibrium to exist

Proposition 5 – An equilibrium in regime III exists if and only if the following conditions hold:

- (i) $(1 + \beta) \ln(a_2 - R_C) - \beta \ln p_C^* + \alpha_C - \phi_C < (1 + \beta) \ln a_2 - \beta \ln p$.
- (ii) $(1 + \beta) \ln(a_1 - R_C) - \beta \ln p_C^* + \alpha_C > (1 + \beta) \ln a_1 - \beta \ln p$.
- (iii) $(1 + \beta) \ln(p_C^* a_S) - \beta \ln p - \phi_C < (1 + \beta) \ln(p a_S) - \beta \ln p$.
- (iv) $(1 + \beta) \ln(a_2 - R_C(1 + ba_2)) - \beta \ln p_C^* + \alpha_C < (1 + \beta) \ln a_2 - \beta \ln p$.
- (v) $\alpha_C - \alpha_B \geq \beta(\ln p_C^* - \ln p - \frac{\phi_B}{1+\beta})$.

Proof of Proposition 5 – For an equilibrium in regime III to exist, the the cadres must be better-off in the periphery. This is equivalent to (i). Second, the bobos must be better-off in the city, which is equivalent to (ii). Third, the workers in the periphery should not have an incentive to commute to the city, implying that (iii) must hold. Fourth, the cadres should not be better-off locating and working in the city, i.e. (iv) should hold.

Finally, the bobos should not be better-off by deviating from the equilibrium value of α and picking an ex-post level of amenities that would induce the workers to commute to the city. The price that would induce them to do so is given by the RHS of (3), which we now denote by $p_{AB}^*(\phi)$ ³⁴. If this is lower than the autarky price of services obtained from (10) and (11), then suburban workers commute to the city. This happens iff $p_{AB}^*(\phi) < p^*$, or equivalently

$$\phi < (1 + \beta)(\ln p_C^* - \ln p) = \phi_{\max}.$$

In the zone where $\phi < \phi_{\max}$, the bobo's utility is given by $(1 + \beta) \ln(a_1 - R_C) - \beta \ln p_{AB}^*(\phi) + \alpha$.³⁵ Therefore they maximize $\alpha - \beta\phi(\alpha)/(1 + \beta)$, as in

³⁴The subscript *AB* refers to the fact that this relationship between p^* and ϕ must hold in both regimes I and II.

³⁵Choosing an amenity level $\alpha' \neq \alpha_C$ ex-post has no effect on R , since the resale value of the home depends on expected future amenities, while the purchase price of the home

regime II, and pick $\alpha = \min(\alpha_B, \phi^{-1}(\phi_{\max})) = \alpha'$. The bobos will vote for this outcome if and only if it delivers a greater utility than the maximum possible value of α , that is $(1 + \beta) \ln(a_1 - R_C) - \beta \ln p_C^* + \alpha_C < (1 + \beta) \ln(a_1 - R_C) - \beta \ln p_{AB}^*(\phi(\alpha')) + \alpha'$, or equivalently, denoting by $\phi' = \phi(\alpha')$,

$$\alpha_C - \alpha' < \beta(\ln p_C^* - \ln p - \frac{\phi'}{1 + \beta}).$$

We note that if $\phi' = \phi_{\max}$, the RHS is equal to zero. The LHS cannot be negative, as α_C is the maximum value of α . Therefore, this inequality is violated for $\phi' = \phi_{\max}$. It may only hold for $\alpha' = \alpha_B$, which is equivalent to (v) being violated. If that is the case, then ex-post the bobos would pick an amenity level such that workers commute from the suburbs to the city to offer their services. But we can then check that it cannot be rational for workers to locate to the city ex-ante. The reason is as follows: Service prices and amenity levels are the same as in regime II. But in regime II workers prefer to reside in the suburbs, i.e. would get a utility level lower than \bar{u} should they live in the city. For them to locate in the city, it must therefore be that rents are lower than in regime II, that is, $R_t < R_B$. However, we know that under regime II, cadres are indifferent between the two areas. For them to now strictly prefer the periphery, it must be that $R_t > R_B$, a contradiction. Consequently, it must be that (v) holds for regime III to exist.

Conversely, if (i)-(v) hold, then clearly, the outcome computed in the preceding subsection satisfies all the equilibrium conditions. QED.

Properties of regime IIIB – In regime IIIB, both workers and bobos are located both in the city and periphery. The difference between regime III is two-fold. First, condition (ii) is replaced by an equality, stating that bobos are equally better-off in the city and in the periphery:

depends on expected current amenities, given by α_C .

$$(1 + \beta) \ln(a_1 - R_C) - \beta \ln p_C^* + \alpha_C = (1 + \beta) \ln a_1 - \beta \ln p. \quad (22)$$

Second, the service market equilibrium condition is replaced by an inequality: the demand for services in the city has to be lower than if all bobos were located in the city, implying that

$$R_t \leq a_1 \frac{H_1}{X} - \frac{a_S}{\beta} p_t^* \left(1 - \frac{H_1}{X} \right).$$

Consequently, the SME schedule has to be replaced by Equation (22), which is again downward sloping, while the HME schedule is unchanged. Given the equilibrium values of R and p^* , the number of bobos residing in the city, \tilde{H}_1 , is determined by the city equilibrium in the service market, that is

$$\tilde{H}_1 = \frac{R + p^* a_S / \beta}{a_1 + p^* a_S / \beta} X.$$

APPENDIX 2 – Data sources and group assignment

The data sources used were as follows:

For house prices 1998-2015 per urban areas, the professional website

<http://www.meilleursagents.com>

For social housing in 2012-2013, the French ministry of housing at

<http://www.statistiques.developpement-durable.gouv.fr/logement-construction/r/logement-social-parc-social.html>

For social housing 2006-2011, the French national statistical institute at

http://www.insee.fr/fr/themes/detail.asp?reg_id=99&ref_id=base-cc-logement-06

For the sectoral composition of employment, the Analyse Fonctionnelle des Données communales at INSEE

(http://www.insee.fr/fr/themes/detail.asp?reg_id=99&ref_id=analyse)

Income per capita is taken from INSEE at

http://www.insee.fr/fr/themes/detail.asp?reg_id=99&ref_id=structure-distrib-revenus-2011

The population data are from INSEE at

http://www.insee.fr/fr/themes/detail.asp?reg_id=99&ref_id=base-cc-logement-08 (pour 2006-2008)

and

http://www.insee.fr/fr/themes/detail.asp?reg_id=99&ref_id=base-cc-logement-2009 (pour 2009-2011)

The list of trams and vélibs is available from Wikipedia at

https://fr.wikipedia.org/wiki/Liste_des_syst%C3%A8mes_de_v%C3%A9los_en_libre-service_en_France

and

https://fr.wikipedia.org/wiki/Liste_des_tramways_de_France.

This was checked with independent sources: town hall web sites, press articles, and the following web site:

http://www.transbus.org/dossiers/tramway_service.html

The electoral data are from the French Interior ministry, at

http://www.interieur.gouv.fr/Elections/Les-resultats/Municipales/elecresult__municipales_2008/%28path%29/municipales_2008/index.html

The list of urban areas and their group assignment, for $\alpha = 0.1$, with group I being the highest amenity level, is as follows:

Group I: Lyon, Toulouse, Bordeaux, Nice, Strasbourg, Montpellier, Saint-Etienne, Orléans, Angers, Dijon.

Group II: Paris, Marseille, Lille, Nantes, Grenoble, Rennes, Rouen, Avignon, Nancy, Caen, Valenciennes, Le Mans, Reims, Brest, Perpignan, Amiens, Besançon, Pau, La Rochelle

Group III: Toulon, Douai, Lens, Tours, Clermont-Ferrand, Metz, Béthune, Le Havre, Limoges, Bayonne, Dunkerque, Poitiers, Nîmes, Lorient, Annecy, Chambéry, Saint-Nazaire, Troyes

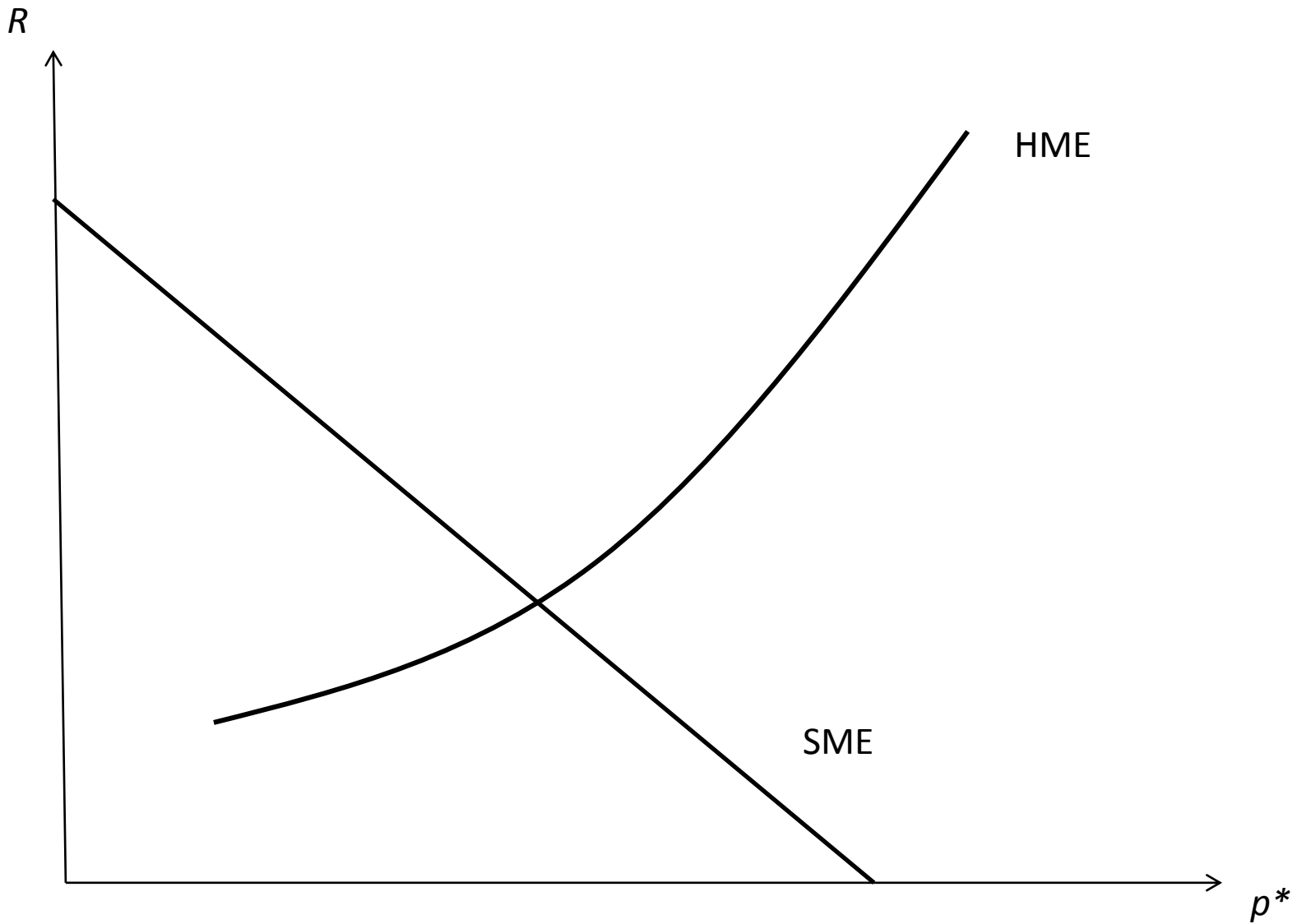


Figure 1 – Equilibrium determination in regime III

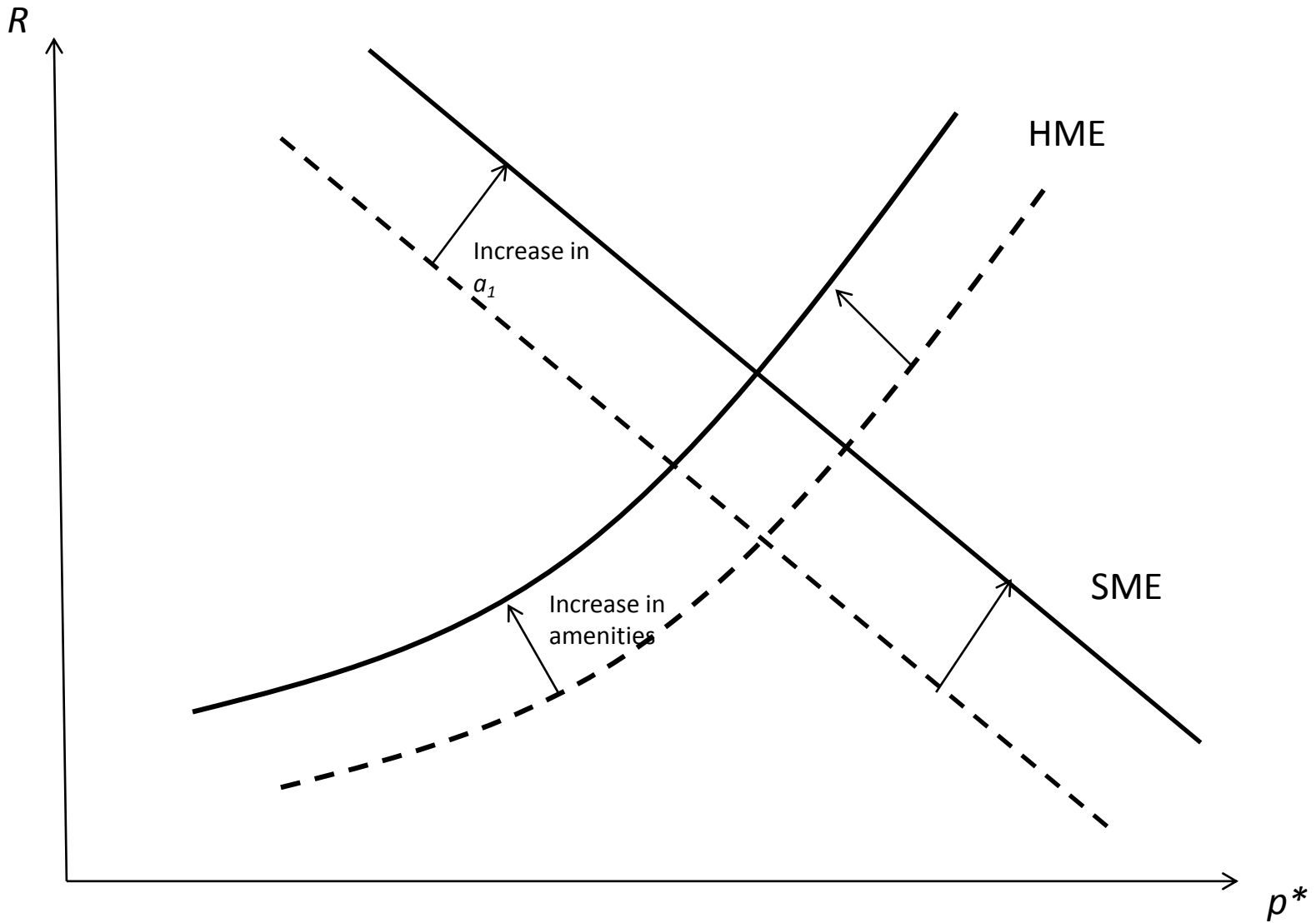


Figure 2 – Effect of α and α_1 on equilibrium rentals and service prices

Figure 3: House rental price in regimes II and III

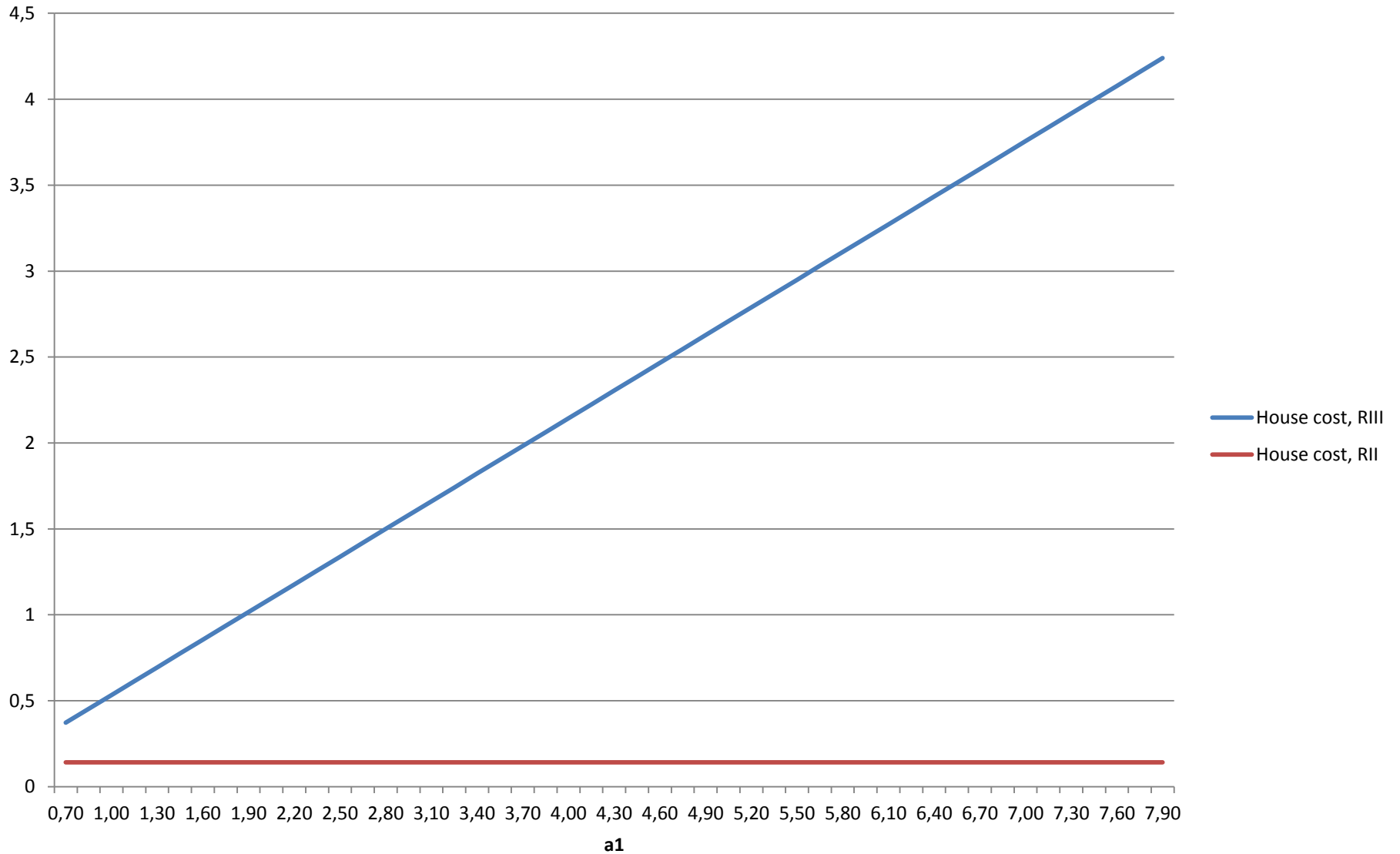


Figure 4: Service price in city in regimes II and III

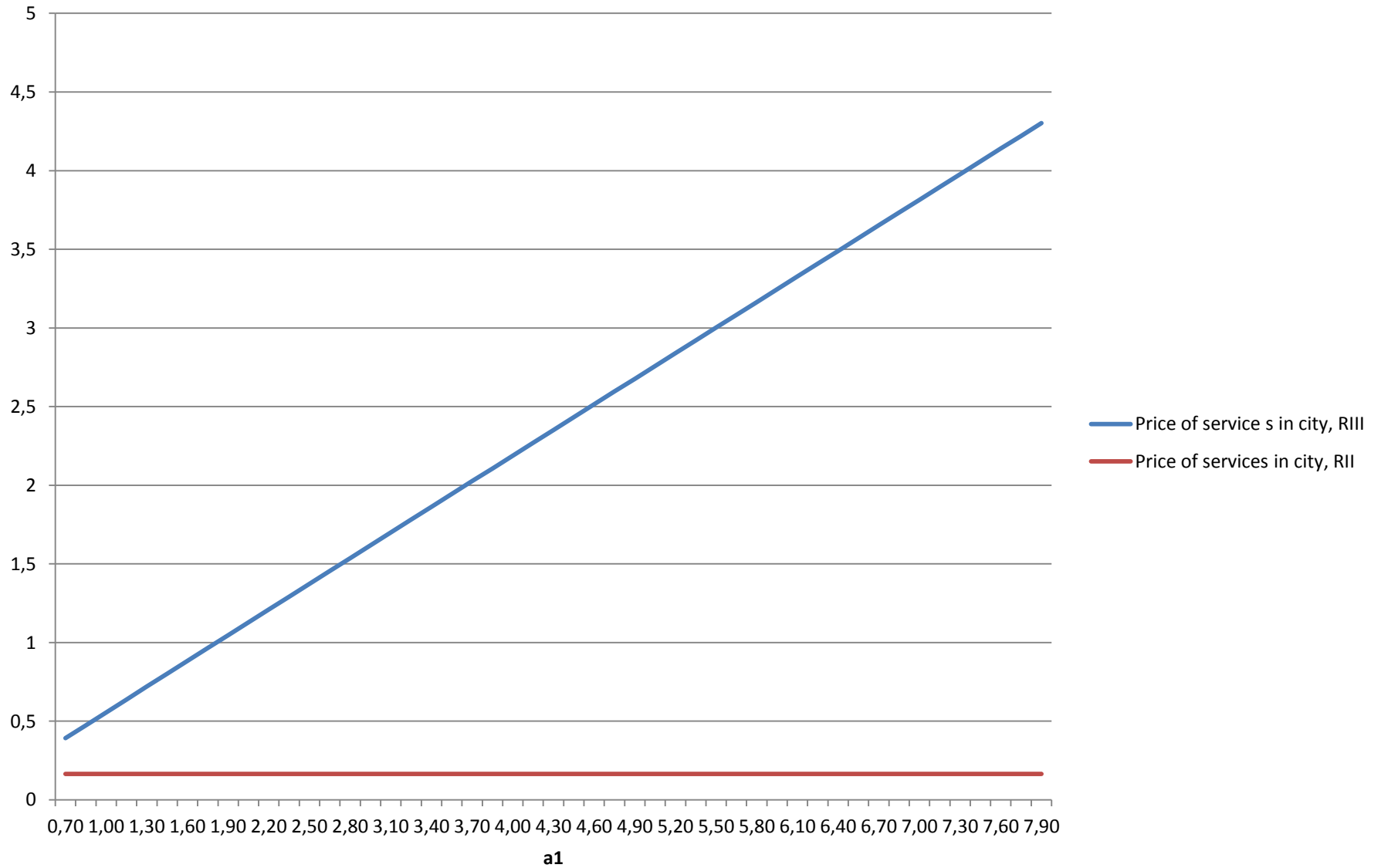
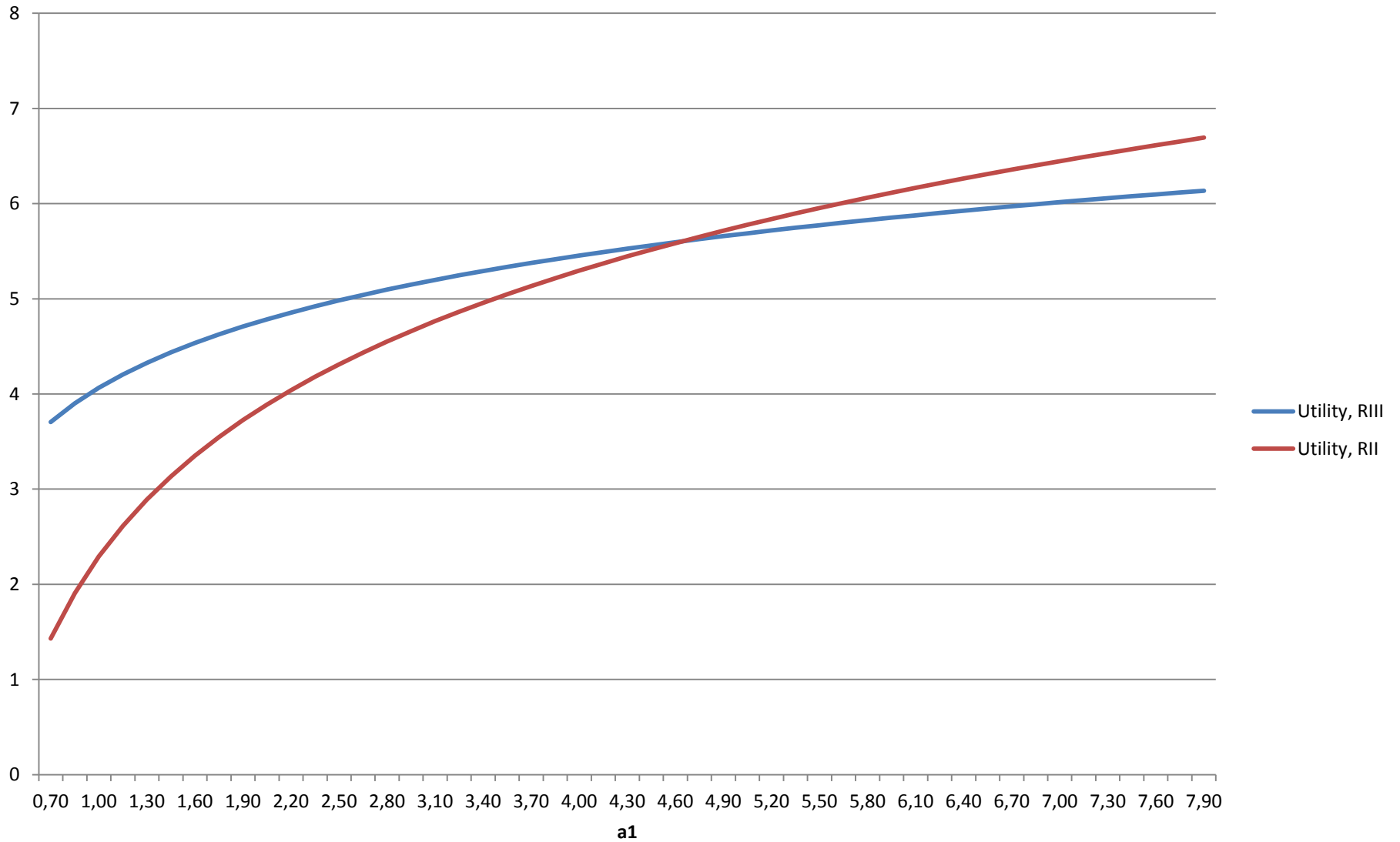


Figure 5: Bobo utility in regimes II and III



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