

Hobbies and Culture: The Value of Internal Goods*

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Abstract

This paper proposes that cultural goods and hobbies are consumption technologies for the production of internal goods that enable humans to derive more pleasure out of time and material resources. This theory can explain why you would have had to be relatively poor to invent a free hobby and wealthy to invent a costly one. It furthermore explains why there is complementarity between loving art and music, ascetic preferences, conspicuous leisure, income inequality and its persistence over time, and identifies a novel argument for schools to have music and art on the curriculum.

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JEL-Classification: J22, J24, D13

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1 Introduction

‘I got plenty o’ nuttin’,
and nuttin’ is plenty for me.’ (Porgy and Bess)

What does the break-dancing man in the street have in common with the Chief Executive on the golf course? They have both acquired hobby skills. The former because he has nothing; the latter because he has plenty.

Countries differ in terms of the nature of cultural goods they invented and how inventive they have been. Many sports, such as tennis, golf and football, had their origin in the British Isles, and several technologies for the production of music originated in Germany and Italy, the latter furthermore being the cradle of architecture and several art forms. So why were these goods invented?

This paper proposes that cultural goods and hobbies are consumption technologies for the production of internal goods that enable humans to derive more pleasure either out of time or from material resources. The internal goods represent pleasures such as the experience of a ‘hole-in-one’ in golf, mastering the intricate steps of tango, succeeding with your roses, or playing a virtuous piece of music.¹

This theory explains several empirical phenomena that have hitherto been assumed if modelled since there existed no mechanism that could explain them. These include the existence of cultural goods², complementarity between different kinds of

¹Alfred Marshall (1890) classified such pleasures as an *internal-personal-non-transferable good*. The consumption and production of these goods cannot be separated. Hence, if you wish to consume it, you have to acquire the skills to produce it.

²There are numerous examples of cultural goods that were invented at the top or bottom of society, for example the intricate steps of tango emerged in the shabby quarters of Buenos Aires, or that the Royal and Ancient Golf Club in St Andrews was the invention of 22 noble and gentlemen

human capital,³ ascetic preferences⁴ and conspicuous leisure.⁵ More specifically I show that there is complementarity between skills that enable an individual to derive more pleasure out of time, such as music, and skills that enable the individual to derive more pleasure out of resources, such as art. Thus it explains why individuals who like music also tend to have developed a taste for art and vice versa. The theory also provides an additional explanation to the extensively studied phenomenon of income inequality and its persistence over time. It finally identifies a novel argument for teaching art and music in schools.

To explain these phenomena it is necessary to introduce several new distinctions in Becker's analytical framework for consumption where individuals use time, personal capital and market goods in the production of commodities from which they derive utility.⁶ I subdivide personal capital into three separate categories. First, hobby skills that can be used to produce free internal goods, such as singing. Second,

of Fife (www.theroyalancientgolfclub.org). This paper explains why.

³Becker and Stigler (1977), and Becker (1993) assumed that the production of consumption capital is a function of not only human capital that is specific to the consumption of that particular good but to other forms of human capital as well to capture the empirical phenomenon that those that are educated also tend to like 'good' music, art and literature.

⁴To wish to consume less over time is a phenomenon that appears to contradict the fundamental principles of utility maximisation. This paper reveals a mechanism that can explain how a utility maximising individual could develop a taste for an ascetic lifestyle.

⁵To explain why the wealthy leisure class would choose expensive hobbies Veblen (1899) introduced the notion that there existed a conspicuous motive. This paper derives a mechanism which explains why they would do so even in the absence of such a motive.

⁶This framework was developed in two stages. First Becker (1965) introduce the notion that consumption takes time. The second stage was to include personal and social capital that determine how much utility an individual derives from a good (Becker and Stigler (1977)).

hobby skills that can be used to produce costly internal goods, such as playing golf. Third, professional skills that make the individual more productive in the labour market. These analytical distinctions can be used to define three basic categories of consumption technologies. First, those that require time and market goods only. Second, those that require time, market goods and skills, which shall be referred to as costly hobbies. These can furthermore be divided into those with a time commitment, and those without. Finally those that require time and skills only, which shall be referred to as free hobbies. For the last two technologies the individual gets pleasure from being good at what she does, which shall be referred to as an internal good.

Hobbies provide an individual with the opportunity of doing something else gainful once he is bored of consuming market goods and therefore allow him to get more utility out of leisure time. A hobby also enables the individual to derive more utility out of his resources.⁷ For example having ten pairs of specialised shoes for different activities gives higher utility than ten pairs of shoes for the same activity, provided the individual has the skills to benefit from the different activities.⁸ This is why a hobby can be modelled as an alternative consumption technology, where the utility from resources and time allocated to that activity depends on the skills of the individual. Hobbies and cultural goods thus increase welfare by expanding the set of available consumption technologies, provided that the individual has acquired the skills.

The idea that hobbies matter is not new. Already in 1917 the National Education Association listed “preparation for the worthy use of leisure time” as one of the seven basic objectives of education.⁹ Since hobbies enable people to do something

⁷Costly hobbies can therefore explain the complementarity between time for leisure and recreation goods that was found by Owen (1971).

⁸The marginal utility of dancing shoes will be higher the better a dancer the person is.

⁹National Education Association, *Cardinal Principles of Secondary Education*. Washington,

meaningful with their leisure even when they have limited resources, Anderson (1955) argued that hobby skills simultaneously reduce anti-social behaviour as well as providing lifelong benefits to those who acquire them. This paper adds a third reason for why hobbies may be beneficial to society which is their impact on the individual's labour market aspirations.¹⁰ Since these skills make an individual value his time and resources more it gives the individual a stronger incentive to acquire professional skills, thus creating a complementarity between hobby skills and professional skills.

However, the fact that cultural goods increase utility is not sufficient to make it worthwhile to invent a hobby since it is costly to invest time to acquire the skills. If the individual can afford a high level of consumption, she has a higher opportunity cost of time and may therefore be reluctant to invest the time. To invent a free hobby you therefore have to be relatively poor to make it worthwhile, whereas to invent a costly hobby you have to be wealthy enough for the marginal utility of having access to an alternative consumption technology to dominate the higher opportunity cost of time.

The mechanism through which the individual will develop an ascetic taste runs as follows. The larger the stock of human capital for the production of internal goods, the more time will the individual optimally allocate to those, and the less time will he allocate to the consumption of market goods. This in turn will imply that he will

D.C.: Bureau of Education, Department of the Interior, 1917.

¹⁰Barron et. al. (2000) provided empirical evidence of the implications from athletic hobbies on education and labour market participation. Their result that differences reflect differences across individuals in ability and value of leisure is being modelled in this paper. The problem for the incentive to acquire professional skills if the individual is able to afford a high level of consumption is also a theme in Owen (1995). However, what makes hobbies interesting is that the effects from hobbies are not equivalent to consumption of market goods.

value market goods less, and skills to produce internal goods more. Thus someone who invests in only free hobby skills, will over time wish to consume less market goods and more internal goods.

An individual with plenty of resources who can choose between a free and a costly hobby would prefer a costly hobby since it would allow him to consume an internal good and market goods at the same time. A wealthy person would thus rationally allocate more resources to his hobby the more skilled he is at what he does. Hence, what might appear to be conspicuous leisure (Veblen (1899)), could be a rational choice of a consumption technology that allows the individual to consume several goods at the same time without any conspicuous motive.¹¹ This result is consistent with the idea in Burenstam Linder (1970) that the increase in opportunity cost of time has increased the consumption of goods per unit of time.

This paper makes a conceptual contribution that has potentially important analytical implications for the modelling of the cultural sector, as well as other markets where the preferences are endogenous due to specific human capital investments.¹²

I illustrate several of the implications from the theory with examples where the different consumption technologies are each represented by a Cobb-Douglas technology with constant returns to scale. Thus the results can be derived in a very classical framework and do not require any unusual technical assumptions to be made. This is possible since the ideas in this paper represent fundamental principles behind the existence of hobbies and cultural goods, rather than properties of a particular model.

¹¹For example in the case of golf the individual consumes both the pleasure of the activity itself (an internal good), the special outfit he wears, the exercise, the beauty of the landscape (an internal good), the company and so on.

¹²See Becker (1992, 1996) for examples of goods with endogenous preferences.

The choice of analytical examples has thus been guided by the wish to make the working of the mechanism accessible through the use of familiar functional forms, rather than providing technical insights into detailed mathematical properties. The latter is left for future research.

The paper proceeds as follows. Section 2 derives optimal leisure when individuals have hobby human capital. An example is used to illustrate the mechanism that explains why there is complementarity between skills to appreciate art and music. Section 3 derives the value of internal goods when leisure and resources are determined endogenously. Section 4 derives the economic origins of hobbies and cultural goods. Section 5 analyses the role played by hobbies in explaining income inequality and its persistence over time. The paper concludes with a discussion including policy implications for the school curriculum in Section 6.

2 Optimal leisure

This section derives the implications from the theory that cultural goods and hobbies are consumption technologies that enable humans to derive more pleasure either out of time or from material resources. This will be done in two steps. First the general problem for optimal leisure when the individual has free and costly hobby skills is outlined. This is followed by the simplest possible analytically tractable model that illustrates the two mechanisms at work.

Following Becker (1965, 1996) a household is seen as a producer of goods as well as a utility maximiser. The individual produces goods (internal or external) $z_i > 0$, using a production technology $g_i(H_i, x_i)$ with hobby specific human capital¹³ H_i , and

¹³This is an important deviation from Becker, who included all forms of human capital in the

market goods x_i , where $\partial g_i/\partial H_i \geq 0$ and $\partial g_i/\partial x_i \geq 0$. Hence, it is assumed that hobby human capital and market goods have either a positive or no impact on the quantity of the good produced.

Definition 1 *If $g_i(H_i)$ good i is a free internal good that is produced using free hobby human capital H_F .*

Definition 2 *If $g_i(H_i, x_i)$ good i is a costly internal good that is produced using costly hobby human capital H_C .*

Let λ_i be the share of leisure time spent consuming good i . The individual derives utility from spending time consuming these goods $u(\lambda_i, z_i)$. The marginal utility is diminishing in both the quantity consumed and the time spent consuming the good. Thus the utility function is strictly concave in both arguments, $\partial u_i/\partial \lambda_i > 0$, $\partial^2 u_i/\partial^2 \lambda_i < 0$, $\partial u_i/\partial z_i > 0$, $\partial^2 u_i/\partial^2 z_i < 0$, and $\partial^2 u_i/\partial z_i \partial \lambda_i \geq 0$.

The individual consumes three types of goods. External once that do not require skills, which we shall refer to a pure consumption, and internal once which do require skills, but may or may not require market goods. The latter are the hobbies or cultural goods that the individual has acquired skills to be able to enjoy, such as singing a song, or playing the piano.

Definition 3 *Hobbies and cultural goods are consumption technologies $u_i(\lambda_i, g_i(H_i, x_i))$ for the production of internal goods.*

In what follows we shall derive the mechanism that not only shows why hobbies enable humans to derive more pleasure out of time and market goods, but also why there can be complementarity between free and costly hobby skills.

produciton function thereby assuming the complementarity that will be derived in this paper.

An individual who has n different technologies for consumption can optimise his leisure by allocating time and resources across n different activities to maximise

$$\max_{\lambda_i, z_i} \sum_{i=1}^n u_i(\lambda_i, z_i) \quad (1)$$

subject to the production technologies

$$z_i = g_i(H_i, x_i) \quad (2)$$

the time constraint

$$\sum_{i=1}^n \lambda_i = 1, \quad (3)$$

and the budget constraint

$$\sum_{i=1}^n x_i \leq W. \quad (4)$$

Substitution of the production technologies and $\lambda_n = 1 - \sum_{i=1}^{n-1} \lambda_i$ and $x_1 = W - \sum_{i=2}^n x_i$ into the objective function and maximising over time λ_i and money x_i spent on activity i the first order conditions for an interior solution for λ_i and x_i become

$$\frac{\partial u_i}{\partial \lambda_i} - \frac{\partial u_n}{\partial \lambda_n} = 0, \quad (5)$$

$$-\frac{\partial u_1}{\partial z_1} \frac{\partial g_1}{\partial x_i} + \frac{\partial u_i}{\partial z_i} \frac{\partial g_i}{\partial x_i} = 0. \quad (6)$$

The marginal utility of spending more time and money on each activity has to be equal, which gives optimal time slices λ_i^* and quantities z_i^* of goods produced. The maximised utility is a function of wealth W and a vector of hobby skills \mathbf{H} ,

$$U(W, \mathbf{H}) = \sum_{i=1}^n u_i(\lambda_i^*, z_i^*). \quad (7)$$

The marginal value of internal goods can be calculated by differentiating the maximised utility with respect to \mathbf{H} , that is the direct value of hobby skills that enable the production of z_i is U_{H_i} . There is also an indirect effect if hobby skills

increase the marginal value of wealth and the stock of other hobby skills, thus if $U_{WH_i} > 0$ and $U_{H_i H_j} > 0$.

In what follows we shall derive the implications from these two mechanisms by considering the simplest possible analytically tractable model that can be used to illustrate the value of internal goods. In this model we consider an individual who in addition to ‘regular consumption’, also consumes two types of cultural goods. One which allows the individual to derive more pleasure out of material resources, such as art, or a costly hobby, and one which allows the individual to derive more pleasure out of time such as singing and dancing. In this example we shall represent consumption technologies by the Cobb-Douglas utility function $u(\lambda_i, z_i) = \lambda_i^a z_i^{1-a}$.

There are three available technologies for the production of commodities. One does not require any hobby skills $g_1(x_1) = x_1$, for example dining. Let the share of time spent dining be denoted λ . Substitution of the budget constraint, the money spent on dining will be $x_1 = W - x_2$. The utility in this activity is thus $u(\lambda, z_1) = \lambda^a (W - x_2)^{1-a}$.

The individual has two sets of hobby skills. The first enables the individual to derive more pleasure out of resources, which could either be a hobby with a fixed time commitment, such as going to the theatre, or signing up for an evening course, or becoming an art collector, or playing golf. We shall model this as a technology $g_2(x_2, H_C) = x_2 H_C^{\frac{a}{1-a}}$, which uses both skills and money. This activity takes a share μ of his time, but the individual can decide how much resource he wants to spend on the activity. The utility if he uses this consumption technology is thus $u(\mu, z_2) = (\mu H_C)^a x_2^{1-a}$.

The second hobby enables the individual to derive more pleasure out of time, such as singing, where the joy the singing generates depends on how skilled the individual

is. Thus the technology can be represented by $g_3(H_F) = H_F$. Substitution of the time constraint gives the utility from singing $u((1 - \lambda - \mu), z_3) = (1 - \lambda - \mu)^a H_F^{1-a}$.

The individual decides how much time to allocate to dining and singing, and how much money to allocate to dining and golf. The maximisation problem is

$$\max_{\lambda, x_2} \left[\lambda^a (W - x_2)^{1-a} + (\mu H_C)^a x_2^{1-a} + (1 - \lambda - \mu)^a H_F^{1-a} \right]. \quad (8)$$

The first order conditions with respect to time spent dining λ and money spent on golf x_2 are

$$a \left(\frac{W - x_2}{\lambda} \right)^{1-a} - a \left(\frac{H_F}{1 - \lambda - \mu} \right)^{1-a} = 0, \quad (9)$$

$$-(1 - a) \left(\frac{\lambda}{W - x_2} \right)^a + (1 - a) \left(\frac{\mu H_C}{x_2} \right)^a = 0. \quad (10)$$

Time is allocated so that the marginal utility of spending an additional minute dining is equal to the marginal utility of singing another song. Money is optimally allocated, such that the marginal utility of the last golf sweater is equal to the marginal utility of another dinner jacket.

Solving for x_2 and λ in (9) and (10)

$$x_2^* = \frac{\mu H_C [W + H_F]}{(1 - \mu) + \mu H_C}, \quad (11)$$

$$\lambda^* = \frac{(1 - \mu)W - \mu H_C H_F}{W + H_F}. \quad (12)$$

Thus there will be an interior solution if the individual is wealthy enough relative to his hobby skills, that is for $W > \mu/(1 - \mu)H_C H_F$.¹⁴

It should be noted that having free hobby skills has the same effect on money spent on golf x_2^* , as wealth. Hence, in terms of optimising leisure, having skills that enable the production of personal internal goods is equivalent to having wealth. There

¹⁴This is a feature of this particular, since the different consumption technologies are substitutes.

is thus a rational for the widely used concept of cultural capital. As this example illustrates, having a technology and the skills to produce an internal good can be analytically equivalent to having wealth. The wealthier and the more able a singer and a golfer the person is, the more money will he allocate to golf. Looking at time allocated to dining λ^* , the individual will allocate more time to dining the wealthier he is, and less time to dining the more skilled a singer and a golfer he is.

Why will he spend more time singing the more skilled a golfer he is? The more skilled a golfer he is the more resource he will put into golf, and therefore less into dining. Having put less into dining reduces the opportunity cost of time singing, which makes the individual spend more time singing. Why will he spend more resource on golf the more skilled a singer he is? The more skilled a singer, the more time will he spend singing, and thus less time dining. The marginal utility of putting more resource into dining, given that less time is spent dining is therefore lower, which makes it optimal to spend more resource on golf.

Substitution of x_2^* and λ^* into the objective function one gets an expression for the optimised utility of leisure given by

$$U(W, H_C, H_F) = [(1 - \mu) + \mu H_C]^a [W + H_F]^{1-a}. \quad (13)$$

This can be compared with the utility the individual would have got had the only available consumption technology been dining, in which case he would have spent all his money and time dining $U(W) = W^{1-a}$. For $H_C > 1$, and $H_F > 0$, having hobby skills will increase the pleasure he can derive out of his leisure. As long as he can sing at all, this will have a positive impact on his utility, whereas golf skills will only be valuable to the individual if he is sufficiently good a golfer. If he is not very good, committing himself to go round the golf course on a regular basis and spending

money on golf accessories will leave him worse off, than not having committed himself to golf and enjoying longer more luxurious meals instead.

Thus if a hobby involves a time commitment the individual will only sign up for it if he expects to be sufficiently good at it. This can thus explain why individuals may abstain from picking up golf, even if they can afford it. Free hobbies on the other hand are usually characterised by there not being a time commitment, and if that is the case, this example shows that the individual would benefit as long as he can do it.¹⁵

This example thus illustrates the two fundamental mechanisms through which cultural goods increase welfare that goes beyond the direct benefits from consuming the cultural good itself. Since art is an example of a cultural good that enables humans to derive more pleasure from material resources, and music is an example of a cultural good that enable the individual to derive more pleasure out of time, this example thus explains why those who love art are also likely to have developed a taste for music and vice versa.¹⁶

Thus an important implication from the theory that these goods represent different consumption technologies is that it can explain complementarity between very different sets of skills.

Proposition 1 *Hobby skills that enable humans to derive more pleasure out of time and from material resources respectively are complementary in generating welfare.*

Proof: To show this we have to check the cross derivative of the maximised utility

¹⁵Hence, the theory would predict that the average skills of someone who sings in the shower, will be lower than the average skills of an amateur golfer.

¹⁶Note that playing an instrument becomes a free hobby once the individual has bought the instrument

with respect to different skills. Thus

$$\frac{\partial^2 U}{\partial H_C \partial H_F} = \frac{(1-a)a}{[1-\mu+\mu H_C]^{1-a} (W+H_F)^a} > 0. \quad (14)$$

which is indeed positive. Hence the marginal utility from being able to produce a costly internal good will be higher if the individual can produce a free internal good as well. Q.E.D.

What is the intuition? Having a free hobby implies the individual will allocate less time to pure consumption, which in turn implies the individual will allocate more resources to a costly hobby. This in turn implies that the marginal value of producing more of the costly internal good has increased. Taking the example of art and music. The theory then implies that the more talented amateur pianist the individual is, the more will she invest in art and fine furniture.

There is also complementarity between costly hobbies and wealth, but not between free hobbies and wealth. Note that the marginal utility of wealth is given by

$$\frac{\partial U}{\partial W} = (1-a) \left[\frac{(1-\mu) + \mu H_C}{W + H_F} \right]^a, \quad (15)$$

from which follows that

Proposition 2 *The larger the stock of free hobby skills, the less the individual values having wealth on the margin.*

Proof: The cross derivative is negative,

$$\frac{\partial^2 U}{\partial W \partial H_F} = -\frac{a(1-a)}{W+H_F} \left[\frac{(1-\mu) + \mu H_C}{W+H_F} \right]^a < 0, \quad (16)$$

hence the larger the stock of free hobbies the less the individual will value wealth. Q.E.D.

The more free hobby skills the individual has the more time will he allocate to free hobbies and the less time will he allocate to consumption of market goods, which is why the individual will value being able to afford a higher level of consumption less on the margin the greater the utility he derives from a free internal good.

Internal goods can also explain why individuals would rationally choose an expensive hobby if they are wealthy.

Proposition 3 *The individual values consuming market goods more the larger his stock of costly hobby skills.*

Proof: In this case we need to confirm that the cross derivative with respect to wealth and costly hobbies is positive,

$$\frac{\partial^2 U}{\partial W \partial H_C} = \frac{a(1-a)\mu}{(1-\mu) + \mu H_C} \left[\frac{(1-\mu) + \mu H_C}{W + H_F} \right]^a > 0. \quad (17)$$

Q.E.D.

If there is complementarity between market goods and skills, which there will be if the individual appreciates a finer instrument more on the margin the more skilled he is playing it, the individual will spend more money on his hobby the wealthier he is, and also value being wealthy more the more skilled he is in his hobby. Thus whilst spending a lot of money on a hobby might appear as conspicuous leisure, it is perfectly rational if the money is complementary to the skills in producing the internal good.

These results were derived in a model where there is a fixed endowment of wealth and time for leisure. Next let us consider the incentives to work for an individual who has access to different consumption technologies. When the individual has the option to work, both money and time for leisure will be endogenously determined. The question is then, what is the value of internal goods for someone who can decide

how much to work, and thus influence his material resources and how much time he has left for leisure?

3 Incentives to work

Consider an individual who has professional skills $S > 0$ that enable him to increase his wealth by working. How much time should an individual who has both professional and hobby skills optimally allocate to work? Furthermore how do internal goods influence the value from having professional skills?

The wealth is now decomposed into an endowment \bar{w} and income from work, which depends on professional skills $S > 0$, monetary returns to skills $w > 0$, and time spent working t . Let the productivity at work be denoted $f(t, S)$. It is a continuous function which is increasing in both arguments, that is $f_t > 0$, and $f_S > 0$. Being more skilled does not reduce the marginal productivity at work, that is the cross derivative is $f_{tS} \geq 0$. The more skilled and the more time the individual works the more he produces. For each unit he produces he gets paid w . Hence the income is $wf(t, S)$.

First we shall consider the optimal time spent working for general functional forms to illustrate the various trade-offs. This is done when the individual's opportunity cost of time is constant for analytical convenience. In the following example we relax this assumption.

The individual chooses t to maximize

$$\max_t (1 - t)U(W, \mathbf{H}) \tag{18}$$

subject to

$$W = wf(t, S) + \bar{w}. \tag{19}$$

Substitution of W into the objective function and maximising over t gives a first order condition for an interior solution,

$$-U(W, \mathbf{H}) + (1 - t) \frac{\partial U}{\partial W} w f_t(t, S) = 0. \quad (20)$$

At the optimum the opportunity cost of time, which is the value of optimal leisure has to be equal to the time spent on leisure times the marginal increase in utility from earning more times the wage times the marginal productivity of working more.

Total differentiation with respect to time t and hobby skills H_i gives

$$\frac{dt^*}{dH_i} = \frac{\frac{\partial U}{\partial H_i} - (1 - t) \frac{\partial^2 U}{\partial W \partial H_i} w f_t}{-2 \frac{\partial U}{\partial W} w f_t + (1 - t) \left[\frac{\partial^2 U}{\partial^2 W} (w f_t)^2 + \frac{\partial U}{\partial W} w f_{tt} \right]}. \quad (21)$$

The denominator is the second order condition which has to be negative for the first order condition to be an optimum.

There are two effects from an increase in hobby skills. The first is the increase in opportunity cost of time $\partial U / \partial H_i > 0$, having a hobby makes leisure more valuable. The second is the effect from more hobbies on the marginal utility of earning more. As we saw earlier this latter effect depends on whether the hobbies are costly or free. The individual will definitely spend less time working if $\frac{\partial^2 U}{\partial W \partial H_i} < 0$, that is if the hobbies are free, but may work more if $\frac{\partial^2 U}{\partial W \partial H_i} > 0$, that is if hobbies are costly. This can happen if the hobby has a sufficiently positive impact on the marginal utility of increase in income.

The effect from wealth is

$$\frac{dt^*}{d\bar{w}} = \frac{\frac{\partial U}{\partial W} - (1 - t) \frac{\partial^2 U}{\partial^2 W} w f_t}{-2 \frac{\partial U}{\partial W} w f_t + (1 - t) \left[\frac{\partial^2 U}{\partial^2 W} (w f_t)^2 + \frac{\partial U}{\partial W} w f_{tt} \right]}. \quad (22)$$

There are two effects from wealth. The first is the increase in opportunity cost of time. The second is the marginal effect on utility from earning more. These two

effects work in the same direction, that is the individual spends less time working the larger the endowment of wealth. Hence, it is the same as the effect from free hobbies.

The effects from professional skills are,

$$\frac{dt^*}{dS} = \frac{\frac{\partial U}{\partial W} w f_S - (1-t) \left[\frac{\partial^2 U}{\partial^2 W} w f_t + \frac{\partial U}{\partial W} w f_{tS} \right]}{-2 \frac{\partial U}{\partial W} w f_t + (1-t) \left[\frac{\partial^2 U}{\partial^2 W} (w f_t)^2 + \frac{\partial U}{\partial W} w f_{tt} \right]}. \quad (23)$$

In this case there are three effects. The first is the income effect from being able to afford a higher level of consumption. Then there are two effects which determine how the marginal benefits from working are affected by being more skilled. The first is the effect on marginal utility of wealth when the individual earns more (which is negative). The second is the marginal utility of wealth times the wage times the increase in marginal productivity of time spent working as a result of being more skilled (which is positive). Whether the individual works more or less depends on which effect dominates.

The effect from an increase in the wage is similar to the effect from professional skills,

$$\frac{dt^*}{dw} = \frac{\frac{\partial U}{\partial W} f(t, S) - (1-t) \left[\frac{\partial^2 U}{\partial^2 W} f(t, S) w f_t \right] + \frac{\partial U}{\partial W} f_t}{-2 \frac{\partial U}{\partial W} w f_t + (1-t) \left[\frac{\partial^2 U}{\partial^2 W} (w f_t)^2 + \frac{\partial U}{\partial W} w f_{tt} \right]}. \quad (24)$$

There are three effects, and the total effect depends on whether the income or the substitution effect dominates.

In our running example we can derive analytically tractable results that provide intuition for how the effects from skills and wage may be indirectly influenced by hobby skills.

Let $V(S, \mathbf{H})$ denote the maximised utility. Then the individual's optimisation problem can be written as follows. The individual allocates time between work and leisure, where leisure has been optimised for hobby skills and wealth.

$$V(S, H_F, H_C) = \max_t (1-t)^b [(1-\mu) + \mu H_C]^a [W + H_F]^{1-a} \quad (25)$$

subject to

$$W = wSt + \bar{w}, \quad (26)$$

where $b > 0$. This parameter captures that an individual may have a different trade-off between work and leisure, and between different leisure activities. For example being bored of playing more golf, does not mean he is bored of having leisure, but that he would rather read a book in the evening after having played golf all day. Such a situation would be captured by $b > a$.

Substitution of W in the objective function and maximising over share of time spent working t gives a first order condition for an interior solution that can be written,

$$(1 - a)wS(1 - t) - b(wSt + \bar{w} + H_F) = 0. \quad (27)$$

The marginal utility from being able to afford a higher level of consumption has to be equal to the opportunity cost of having less time to spend on leisure. Solving for the optimal time spent working,

$$t^* = \frac{(1 - a)wS - b[\bar{w} + H_F]}{(1 + b - a)wS}. \quad (28)$$

There is only an interior solution for $t^* > 0$, thus if,

$$wS > \frac{b}{1 - a}[\bar{w} + H_F]. \quad (29)$$

The more the individual values leisure (b higher), having time to consume (higher a), the higher his wealth and free hobby skills, and the lower his professional skills and monetary returns to skills, the less likely is he to work.

This gives time spent on leisure

$$1 - t^* = b \frac{wS + \bar{w} + H_F}{(1 + b - a)wS} \quad (30)$$

and total resources

$$W^* = \frac{(1-a)[wS + \bar{w}] - bH_F}{1+b-a}. \quad (31)$$

When the individual can influence how much resources he has by working, his total resources will be increasing in his professional skills, and decreasing in his free hobby skills.

Proposition 4 (Ascetic preferences) *The individual will optimally spend less on pure consumption the larger the the stock of free hobby human capital.*

Proof: The consumption of market goods is divided into pure consumption and pursuing an expensive hobby. The total of those is W^* . Thus if W^* is lower, so must x_1^* be.

$$\frac{dW^*}{dH_F} = -\frac{b}{1+b-a} \quad (32)$$

Q.E.D.

An individual with free hobby skills will work less, since he values consumption of market goods less on the margin. The larger the stock of free hobby skills, the less he will therefore optimally consume.

However, an individual with either wealth or free hobbies is going to work more in response to an increase in wage, whereas for someone with no wealth and only costly hobby skills the income and substitution effects will exactly cancel for Cobb-Douglas preferences.

$$\frac{dt^*}{dw} = \frac{b}{1+b-a} \frac{\bar{w} + H_F}{w^2 S} > 0. \quad (33)$$

Whilst the substitution effect is the same, the income effect is smaller the wealthier the person due to diminishing marginal utility of goods. This is why the person with free hobby skills responds positively to an increase in salary and is willing to work more, whereas the individual with no free hobbies or wealth is unaffected.

When there is an interior solution we can substitute for t^* into the objective function to get an expression for the maximised utility when the individual has both professional skills and hobby skills,

$$V(S, H_C, H_F) = \frac{(1-a)^{1-a}}{(1+b-a)^{(1+b-a)}} \left(\frac{b}{wS}\right)^b [(1-\mu) + \mu H_C]^a [wS + \bar{w} + H_F]^{(1+b-a)}. \quad (34)$$

Costly hobby skills increase the maximised utility and are complementary to all other sources to utility, that is to S, w, \bar{w} and H_F . This can be seen by taking the first derivative with respect to H_C which gives

$$\frac{\partial V}{\partial H_C} = \frac{a\mu}{(1-\mu) + \mu H_C} V > 0. \quad (35)$$

Taking second derivatives gives

$$\frac{\partial^2 V}{\partial H_C \partial S} = \frac{a\mu}{(1-\mu) + \mu H_C} \frac{\partial V}{\partial S} \quad (36)$$

$$\frac{\partial^2 V}{\partial H_C \partial H_F} = \frac{a\mu}{(1-\mu) + \mu H_C} \frac{\partial V}{\partial H_F} \quad (37)$$

$$\frac{\partial^2 V}{\partial H_C \partial w} = \frac{a\mu}{(1-\mu) + \mu H_C} \frac{\partial V}{\partial w} \quad (38)$$

$$\frac{\partial^2 V}{\partial H_C \partial \bar{w}} = \frac{a\mu}{(1-\mu) + \mu H_C} \frac{\partial V}{\partial \bar{w}} \quad (39)$$

which are all positive since the first derivative with respect to S, w, \bar{w} and H_F are all positive.

Hence the ability to produce an internal good with the help of time, skills and market goods, implies the individual will value having professional skills, a higher salary, wealth and free hobby skills more on the margin. Thus it provides an individual with positive incentives over all.

Free hobbies on the other hand are only complementary to costly hobbies and wealth. The first has already been shown, whereas the second can be verified by

taking the second cross derivative with respect to wealth and free hobby skills. First note that

$$\frac{\partial V}{\partial H_F} = \frac{1 + b - a}{wS + \bar{w} + H_F} V \quad (40)$$

The cross derivative is thus,

$$\frac{\partial^2 V}{\partial H_F \partial \bar{w}} = \frac{1 + b - a}{(wS + \bar{w} + H_F)^2} [b - a] V. \quad (41)$$

this expression is positive for $b > a$. Thus an individual who is working, but has a strong preference for leisure, will derive more pleasure from his wealth if he also has free hobby skills. This can be compared with the previous section with inelastic labour supply in which case free hobby skills makes the individual value his wealth less on the margin. This is because the combination of some wealth and free hobbies enables the individual to work less and still have a pleasurable time during his leisure. It should also be noted that free hobby skills are also complementary. Thus the more free hobby skills the individual has, the more will he value having even more of those on the margin.¹⁷

Next let us verify the negative result on skills and salary from free hobby skills. Since the effect from w and S are identical, it is sufficient to show that the marginal value of more professional skills is decreasing in the stock of free hobby skills. Note that the first derivative with respect to S is given by

$$\frac{\partial V}{\partial S} = \left[\frac{(1 + b - a)w}{wS + \bar{w} + H_F} - \frac{b}{S} \right] V = \frac{wS(1 - a) - b[\bar{w} + H_F]}{S(wS + \bar{w} + H_F)} V. \quad (42)$$

The cross derivative is given by

$$\frac{\partial^2}{\partial H_F \partial S} = -\frac{1 + b - a}{(wS + \bar{w} + H_F)^2} \left[\frac{awS + b[\bar{w} + H_F]}{S} \right] < 0 \quad (43)$$

¹⁷This mechanism can thus explain how an individual would develop ascetic preferences over time, since there is a stronger incentive to acquire more free skills and optimally consume less market goods.

which is negative. Thus free hobby skills reduces the marginal utility from skills. However, hobby skills do have effects on the change in marginal incentives to acquire professional skills. Taking the second derivative with respect to S one gets

$$\frac{\partial^2 V}{\partial^2 S} = -\frac{awS[(1-a)wS - 2b[\bar{w} + H_F]] - b(1+b)(\bar{w} + H_F)^2}{S^2(wS + \bar{w} + H_F)^2}V. \quad (44)$$

If the individual has no wealth and no free hobby skills, the expression is negative. hence, V is concave in S . However, if the individual has free hobbies and wealth, the function is convex for some range of parameter values. The magnitude of the effect furthermore depends on H_C through V .

Thus an individual with moderate wealth is going to be more keen on acquiring professional skills if he also has hobby skills, and this effect will be further augmented by also having costly hobby skills. This is because more free hobbies will make the individual choose to work more, the higher his professional skills since the income effect will be smaller than the substitution effect. Thus even though the marginal utility of goods is diminishing, the fact that the individual will work more the more skilled, makes the function convex. Thus internal goods do not only generate utility directly but also indirectly by being complementary to other sources to utility.

The most interesting complementarity is the one between different hobby skills, since it predicts that the more individuals consume various internal goods, the more do they wish to consume even more internal goods. This thus explains why individuals who appreciate art, also tend to like reading books, play musical instruments and so on, which was a phenomenon noted by Becker and Stigler (1977) which motivated them to assume that not only human capital that was specific to for example consuming music entered the production function but also other forms of human capital. This theory however explains why this complementarity arises.

Hobbies, and consumption of internal goods in general, imply that the individual spends less time and allocates less resources to ‘pure’ consumption of market goods, and allocates more time and resources to the consumption of internal goods. This in turn implies that the individual values his time during leisure more, and thus is keen to acquire more skills to produce other internal goods.

Internal goods are valuable which is why the technologies have been invented. However, differences across countries indicate that there must also be a reason for internal goods not to be invented as well despite their merits. This section identified the benefits from internal goods. In the next section we shall model the trade-off that determine whether or not an individual will have an incentive to invent a free and a costly hobby respectively.

4 The economic origins of cultural goods

‘The main concern of economics is thus with human beings who are impelled, for good or evil, to change and progress.’ *Alfred Marshall (1890)*.

One important class of inter-temporal decisions that humans could make prior to the existence of capital markets were those relating to developing technologies, including skills and tools, that would enable them to produce desirable goods in future periods. In this section I consider individuals who have fixed resources, but who can choose to spend time and possibly resource on inventing a technology for the production of an internal good.

Consider the following consumption technologies. One is to spend time eating fruit which is an external good requiring no hobby skills, the other is to dance, which is an internal good requiring skills. The individual will get more pleasure out of time

if he does both. However, there is an opportunity cost of time to acquire the skills and to dance, which is the marginal utility of spending another hour eating fruit. This cost will be lower, the less fruit there is. The lower the opportunity cost of time, the more time will he spend dancing once he has the skills. Hence, the lower the level of consumption the lower the opportunity cost of acquiring the skills and the higher the marginal returns from having the skills. Thus the individual has to be relatively poor to find it worthwhile inventing a hobby that is a substitute to eating fruit. Furthermore, the poorer the greater the investment in hobby skills, that is the more intricate will the steps for the dance be.

Next consider the following alternative consumption technologies. One is having dinner, the second is playing golf. In this case the individual will have to be wealthy enough to invent the formalised version of the game. Wealth has three effects. On the one hand the nicer the dinners the individual is currently enjoying the higher the opportunity cost of time. On the other hand, the marginal loss in utility from using resource to invent the hobby is lower the wealthier the individual. Furthermore, the wealthier the individual the more will the individual value having access to an alternative consumption technology that includes the production of a personal internal good. The latter effects will dominate if the wealth is high enough. Thus the individual will have to be wealthy enough to find it worthwhile investing in the skills to pursue a hobby that is a complement to consumption of external goods.¹⁸

The intuition for these two examples can be captured in a simple two period model.

¹⁸Note that a hobby is only preferred to alternative consumption technologies which do not require skills if the individual is skilled enough. The wealthier the individual, the more will he value the marginal effect from being more skilled since he can afford better equipment to match his skills.

Assume that the individual has access to one consumption technology for an external good which uses material resources only, that is $z_1 = g_1(x_1)$. The individual could either invent a technology for an internal good that requires human capital only $z_i = g_i(H_i)$, such as a dance, or one that requires both human capital and resource $z_i = g_i(H_i, x_i)$, such as golf. The production technology for acquiring skills can be represented by a continuous function $h(\mu, x, \theta)$, where $h_\mu > 0$, $h_x \geq 0$ and $\theta > 0$ represents ability. The more able, the greater the skills, $h_\theta > 0$. Time is a necessary input to acquire hobby skills, whereas money may or may not be depending on the nature of the hobby.

Consider a two period model. The endowment income per period is ω . No transfers can be made between the two periods.¹⁹

First consider the case where only time is required to invent a technology involving acquiring hobby skills, that is $H = h(\mu, \theta)$. In the first period the individual decides how much time to spend on inventing for example new dance steps. In the second period, the individual then allocates time optimally between consumption of for example coffee (an external good) and dancing (an internal good). Using the notation from the previous period the problem can be written as follows.

The individual's objective is to maximise utility over the two periods

$$u(\lambda, \omega) + U(\omega, H) \tag{45}$$

subject to

$$H = h(\mu, \theta), \tag{46}$$

¹⁹There are several instances where this would be the case, such as in primitive societies with no credit markets or ability to store, but also for landlords in the past. It would also apply to people living hand to mouth, and more generally those who are credit constrained.

and the time constraint

$$\lambda + \mu = 1. \quad (47)$$

Substitution of the constraints in the objective function

$$u(1 - \mu, \omega) + U(\omega, h(\mu, \theta)) \quad (48)$$

and maximising over μ gives a first order condition for an interior solution

$$-u_\lambda(\lambda, \omega) + U_H(\omega, H)h_\mu = 0. \quad (49)$$

The time spent acquiring skills is decreasing in the endowment income ω . Total differentiation with respect to μ and ω gives

$$\frac{d\mu^*}{d\omega} = \frac{u_{\lambda\omega}(\lambda, \omega) - U_{H\omega}(\omega, H)h_\mu}{u_{\lambda\lambda}(\lambda, \omega) + U_{HH}(\omega, H)(h_\mu)^2 + U_H(\omega, H)h_{\mu\mu}} < 0. \quad (50)$$

The individual will spend less time inventing a free hobby the wealthier he is. There are two reasons for this. The first is the increase in the opportunity cost of time. The second is the effect from wealth on the marginal utility from hobby skills, which we saw was negative for free hobby skills when there is a fixed endowment of wealth. Hence, both effects work in the same direction. This furthermore implies that if the individual is too wealthy he will have no incentive to invent a free hobby.

Consider the following example with Cobb-Douglas utility and constant marginal opportunity cost of time.

$$\max_{\mu} (1 - \mu)\omega^{1-a} + [\omega + \theta\mu]^{1-a} \quad (51)$$

The first order condition is

$$-\omega^{1-a} + (1 - a)\theta [\omega + \theta\mu]^{-a} = 0 \quad (52)$$

solving for optimal time spent inventing

$$\mu = \frac{1}{\theta} \left[\left(\frac{(1-a)\theta}{\omega^{1-a}} \right)^{\frac{1}{a}} - \omega \right]. \quad (53)$$

Hence, the individual will only find it worthwhile to invent skills if the wealth relative to ability is sufficiently low $\omega/\theta < (1-a)$. It has to be lower the greater the weight the individual puts on having time to do things, that is when a is high.

Hence it was no accident that the intricate steps of tango emerged in the shabby quarters of Buenos Aires. The poorer relative to ability, the greater the incentive to create an internal good that would generate immense pleasure.

This mechanism thus explains why some of the earliest examples of human capital-intensive technologies were inventions that enabled humans to derive more pleasure out of leisure, such as gardening, dance and music. There were incentives to invent these activities in primitive societies since the opportunity cost of time was low as a result of the low level of consumption.

Next consider the case where both time and resource are needed to acquire the skills. Thus $H = h(\mu, x, \theta)$. The individual then decides both how much time μ and resource x he is willing to spend to enable him to enjoy a hobby in the future.

$$u(\lambda, \omega - x) + U(\omega, H), \quad (54)$$

subject to

$$H = h(\mu, x, \theta), \quad (55)$$

and the time constraint

$$\lambda + \mu = 1. \quad (56)$$

Substitution of the constraints in the objective function gives

$$u(1 - \mu, \omega - x) + U(\omega, h(\mu, x, \theta)) \quad (57)$$

and maximising over μ and x gives first order conditions for an interior solution

$$-u_\lambda(1 - \mu, \omega - x) + U_H(\omega, H)h_\mu = 0, \quad (58)$$

$$-u_z(1 - \mu, \omega - x) + U_H(\omega, H)h_x = 0. \quad (59)$$

The effect on hobby skills from wealth depends on how the optimal time and resource spent on the hobby respond to changes in wealth. That is

$$\frac{dH}{d\omega} = h_\mu \frac{d\mu}{d\omega} + h_x \frac{dx}{d\omega}. \quad (60)$$

Total differentiation with respect to μ, x and ω gives a system of equations of the following form

$$My = e, \quad (61)$$

where M is the Hessian of the second order derivatives of the objective function with elements m_{ij} , $y = [\frac{d\mu}{d\omega}, \frac{dx}{d\omega}]$ and $e = [e_1, e_2]$ where

$$e_1 = u_{\lambda z} - U_{H\omega}h_\mu, \quad (62)$$

and

$$e_2 = u_{zz} - U_{H\omega}h_x. \quad (63)$$

The sign of e_1 depends on two factors, which work in the opposite direction if it is a costly hobby. The first is the change in marginal utility from more time spent consuming if the level of consumption increases, which is positive. The second is the change in the marginal utility from more hobby skills if wealth increases. The second effect is more likely to dominate the more able the individual is in acquiring the skills, i.e. h_μ higher, and the more the skills allow him to enjoy his resources more. That is the extent to which skills and equipment complement each other.²⁰

²⁰For example the more skilled a musician the more you appreciate having a high quality instrument, since you are able to make it sound magnificent.

The sign of e_2 depends on two factors. First the change in marginal utility when the consumer can afford more, which is negative. Second the change in the marginal utility of hobby skills that are due to having to put resource into the process. For a costly hobby these two effects work in the same direction, that is e_2 is unambiguously negative. Applying Cramer's rule

$$\frac{dH}{d\omega} = \frac{[h_\mu m_{22} - h_x m_{12}]e_1 - [h_\mu m_{21} - h_x m_{11}]e_2}{\det M}. \quad (64)$$

Note that whilst $m_{ii} < 0$ follows from second order conditions the sign of $m_{ij} = u_{\lambda z} + U_{HH}(h_\mu)^2 + U_H h_{\mu\mu}$ is ambiguous. However, substitution for m_{ii} and simplifying the signs of the composite parameters are unambiguous,

$$\frac{dH}{d\omega} = \frac{\overbrace{[h_\mu(u_{zz} + U_H h_{xx}) - h_x(u_{\lambda z} + U_H h_{\mu x})]}^{(-)} e_1 - \overbrace{[h_\mu(u_{z\lambda} + U_H h_{x\mu}) - h_x(u_{\lambda\lambda} + U_H h_{\mu\mu})]}^{(+)}}{\underbrace{\det M}_{(+)}} e_2 \quad (65)$$

Hence the effect is unambiguously positive if e_1 and e_2 are both negative. Thus a sufficiently able individual h_μ high, has to be wealthy enough to find it worthwhile inventing a costly hobby.

Now let us consider our running example with Cobb-Douglas utility where the costly hobby involved a fixed time commitment, but enabled the individual to allocate resources freely. Assume that the cost of acquiring the skills is $q(1 - \lambda)$, for example the price of dance lessons. This example illustrates that it was no accident that the wealthy introduced the formal ball with elegant dresses.

The individual chooses how many dance lessons to attend prior to the ball $(1 - \lambda)$ at a cost q per lesson. In the second period the individual allocates resources optimally between money spent on the gown for the ball and clothes for dining, given her

dancing skills and the duration of the ball. Thus she maximises,

$$\max_{\lambda} \lambda^a (W - q(1 - \lambda))^{1-a} + [\mu + (1 - \mu)H_C]^a W^{1-a} \quad (66)$$

subject to

$$H = \theta(1 - \lambda). \quad (67)$$

Substitution of H and maximising over λ gives a first order condition

$$a \left(\frac{W - q(1 - \lambda)}{\lambda} \right)^{1-a} + (1-a) \left(\frac{\lambda}{W - q(1 - \lambda)} \right)^a q^{-a(1-\mu)\theta} \left[\frac{W}{\mu + (1 - \mu)H_C} \right]^{1-a} = 0. \quad (68)$$

There is only an interior solution if this function is negative at $\lambda = 1$,

$$aW^{1-a}[1 - \theta(1 - \mu)\mu^{a-1}] + (1 - a)W^{-a}z < 0. \quad (69)$$

Solving for W one gets

$$W > \frac{1 - a}{a} \frac{q\mu^{1-a}}{\theta(1 - \mu) - \mu^{1-a}}, \quad (70)$$

provided that a sufficient slice of time has been allocated to the hobby $\mu^{1-a} < \theta(1 - \mu)$.

A time commitment implies that the individual will have strong enough incentives to acquire skills that enable her to really enjoy the ball. Furthermore to benefit from the opportunity of getting an additional dress, she has to be wealthy enough.

A costly hobby allows the wealthy to derive more pleasure out of consumption, whereas a free hobby allows the poor to derive more pleasure out of time.

Next we shall consider the incentives to acquire skills when resources and time for leisure are endogenously determined.

5 Income Inequality

For the man in the street the effort required to be an amazingly skilled street dancer will be lower than the effort required to acquire professional skills that would enable

the same level of utility to be derived from consumption. Whereas by matching highly productive skills with advanced hobby skills the Chief Executive gets higher returns to the investment in both sets of skills since they are complementary. The hobby makes the marginal utility of consumption higher, and being able to afford to play with better golf clubs increases the returns to investing in hobby skills.²¹

These two examples illustrate how the presence of hobbies will increase income inequality and its persistence across generations, since the poor have incentives to acquire free hobbies that weaken their incentives to acquire professional skills and to work, whereas the relatively more wealthy have incentives to acquire skills for costly hobbies that increase their incentives to acquire professional skills.²² This is because free hobbies have the same effect on incentives to acquire professional skills and to work as wealth. Whereas costly hobbies have a more positive effect on incentives to acquire professional skills than monetary returns.

5.1 Hobby skills

Consider an individual who has professional skills but no hobby skills. The individual can spend time and resource to acquire skills in order to get more utility out of leisure in the future.

²¹This argument is in line with Buiter and Kletzer (1991), who argue that productivity growth differentials will be persistent due to differences among the young on how much time they spend on education versus leisure. What I offer here is a mechanism that explains, why the value of leisure may differ between individuals and countries.

²²Martin (1995) examined leisure in southwestern Pennsylvania over the period 1800-1850. An interesting observation was to what extent leisure activities preserved class differences. In my paper I show how these differences actually arise, without any ideological reasons to keep any one out of the Club.

Consider two periods. In the first period the individual decides how much time to allocate to acquiring hobby skills μ and how much to work which will determine how much he can consume net of the cost for the hobby courses $q\mu$. He does this in anticipation of optimising his work and consumption in the future. It is assumed that individuals are credit constrained.²³

Thus

$$\max_{t,\mu} u(\lambda, z) + V(S, H) \quad (71)$$

subject to

$$z = x \quad (72)$$

$$x \leq \bar{w} + wf(S, t) - q\mu \quad (73)$$

$$H = h(\mu, \theta) \quad (74)$$

$$t + \mu + \lambda = 1. \quad (75)$$

The first order condition with respect to time spent working is

$$-u_\lambda + u_z wf_t = 0 \quad (76)$$

hence the marginal utility of spending more time on consumption should be equal to the marginal utility of consuming more. The first order condition with respect to time spent acquiring hobby skills is

$$-u_\lambda - u_z q + V_H h_\mu = 0 \quad (77)$$

²³This assumption could easily be relaxed and would not change the conclusions since, as I have shown in a related paper that explains the inverted U-shape for consumption over the life cycle (see Sällström Matthews (2007a)), individuals will have an incentive to postpone consumption to periods when they have time and skills to enjoy it. Hence, even if capital markets were perfect rational agents will consume less as students than as middle aged professionals.

The marginal cost of hobby skills is the marginal utility of spending more time and resource consuming which have to be equal to the marginal value of having hobby skills in the future.

Is it the more or the less skilled professional who has the strongest incentive to acquire hobby skills?

Total differentiation with respect to t, μ, S , gives a system of equations of the following form $My = e$, where M is the Hessian with element m_{ij} i 'th row and j 'th column, a vector $y = [\frac{dt}{dS}, \frac{d\mu}{dS}]$, and $e = [e_1, e_2]$ where

$$e_1 = [u_{\lambda z} - u_{zz}w f_t] w f_S - u_z w f_{tS} \quad (78)$$

This is the effect on the first order condition for time spent working from a change in skills. There is an income effect inducing the individual to work less if more skilled, and a substitution effect to work more. The sign of e_1 depends on which one that dominates. Differentiating the first order condition for optimal time spent on acquiring hobby skills with respect to professional skills gives

$$e_2 = [u_{\lambda z} + q u_{zz}] w f_S - V_{HS} h_\mu. \quad (79)$$

This one is unambiguously positive if the individual acquires free hobby skills, that is if $q = 0$ and $V_{HS} < 0$. If the individual acquires costly skills, it is unambiguously negative for q high enough. Applying Cramer's rule the total effect on time spent working is

$$\frac{dt}{dS} = \frac{m_{22}e_1 - m_{21}e_2}{\det M} \quad (80)$$

and on time spent acquiring hobby skills

$$\frac{d\mu}{dS} = \frac{-m_{12}e_1 + m_{11}e_2}{\det M}. \quad (81)$$

Note that $m_{ii} < 0$ and $m_{ij} > 0$. Furthermore e_1 will be small, and can even be zero if the substitution and income effect exactly cancel one another. Thus whether having more professional skills induces more or less work, and more or less investment in hobby skills depends on the nature of the hobby skills.

If hobbies are costly, and it is costly to acquire the skills, then time spent working and time spent acquiring hobby skills will both be increasing in professional skills. Thus we get the ‘work hard, play hard result’. Whereas if the hobby is free, time spent working and acquiring hobby skills will both be decreasing in professional skills.

5.2 Professional skills

Consider the incentives to acquire professional skills if the individual has hobby skills. Assume that acquiring professional skills is like working, hence it implies there is less time for leisure. The benefits from working in this case are delayed to the future when the individual will be able to increase consumption by spending some time working. Let $s(t, \phi)$ be a continuous function with $s_t > 0$, and $s_{tt} < 0$ for the production of professional skills.

In the first period the individual spends time t and optimises his leisure for the remaining $1 - t$. Thus

$$\max_t (1 - t)U(\bar{w}, H) + V(S, H) \quad (82)$$

subject to

$$S = s(t, \phi) \quad (83)$$

First order conditions are

$$-U(\bar{w}, H) + V_S s_t = 0. \quad (84)$$

Total differentiation with respect to t, H, w and \bar{w} ,

$$\frac{dt}{dH} = \frac{U_H - V_{SH}S_t}{V_S S_{tt}} \quad (85)$$

$$\frac{dt}{dw} = \frac{-V_{Sw}S_t}{V_S S_{tt}} \quad (86)$$

$$\frac{dt}{d\bar{w}} = \frac{U_{\bar{w}} - V_{S\bar{w}}S_t}{V_S S_{tt}} \quad (87)$$

If the hobby is free, all three effects are negative, hence if the individual has a free hobby the individual will acquire less professional skills. It should also be noted that the individual will also acquire less professional skills if he expects a high return to his skills.

What provides the individual with incentives to acquire professional skills is little wealth and costly hobbies. Hence, having a costly hobby gives stronger incentives to make a career than expecting high returns on ones skills.

Here we can also see the problem of intergenerational transfer of hobby skills. The poor transfer free hobbies to their children which give them weaker incentives to acquire professional skills, whereas the rich transfer costly hobby skills to their children which give them stronger incentives to acquire professional skills.

6 Discussion

Economic analysis takes the set of goods as given. Yet, the variations across cultures as regards the invention of internal goods indicate that we can not take these once as given. This paper has thus addressed a very fundamental question, namely what is the *raison d'être* for cultural goods and hobbies?

The answer to this question is that they play a fundamental role in enabling humans to derive more utility from her available resources. There are two reasons

for this. The first is to derive more pleasure out of time, which resulted in inventions such as sports, games, dance and music. The second is to derive more pleasure out of material resources, which resulted in inventions such as musical instruments, art, architecture, landscaping, fashion and design.

There are several implications from this theory. With a high concentration of capital in a few hands we should expect the arts to flourish as in renaissance Italy²⁴, since they allowed the wealthy to derive more pleasure out of their material resources. With a growing prosperous class of educated people with resources and time to kill the theory would predict the technology for music to advance. This is because being educated they would value their time more, and therefore be willing to invest time into improving their skills. Improving their skills in combination with having wealth would also make them demand finer instruments to match their technical skills. The property that the more free hobby skills the individual has the more will he wish to acquire can explain the broad intellectual curiosities of monks. Furthermore individuals with time to kill, either because of having nothing or because of having plenty, had incentives to invent sports and games. The former, free once such as football and the latter costly once such as golf or polo.

The existence of these goods could furthermore explain why individuals with otherwise identical abilities would choose different career paths. An individual with plenty of free hobby skills would optimally choose a lower level of consumption of market goods, and thus invest less in a career. Similarly an individual who is well endowed with costly hobby skills would optimally choose a higher level of consumption of market goods, and thus invest more in his career, than someone who had no

²⁴In a related paper I explain why wealth is not a sufficient precondition for the renaissance. See Sällström Matthews (2007b)

skills. To the extent that parents choose hobby skills for their children, this is thus a mechanism that could explain both income inequality and its persistence over time.

The existence of cultural goods enable us to give the widely used concept of cultural capital a precise analytical definition, which is the set of technologies for the production of internal goods. This definition differs from Becker's (1996). He refers to cultural capital as preferences and behavioural rules that are more stable than other personal capital that governs behaviour. The reason for this is that the word culture is sometimes used to refer to the cultural sector of the economy, in which case my definition is the relevant one. However, it is also used to refer to an ethnic group, in which case Becker's definition applies. Lazear's (1999) work on language and culture, where he analyses the role played by culture in facilitating communication, is an example of the latter. However, there is an important link between the two definitions since the skills to produce cultural goods is an important part that glues a culture together and thus facilitates communication.

Schools have traditionally taught music, art and sports for the direct benefits they give in terms of the joy they generate, and also the hypothesis they may be generating externalities that enhance overall performance. This paper models the value that is motivating the first reason, and identifies an economic reason for why such activities could help overall performance in schools. The reason that such activities have beneficial effects that goes beyond the subject itself is that they influence the individuals incentives to do well professionally. Acquiring hobby skills makes you value time more, and once you have acquired them they make you value having resources more on the margin. Hence, they provide an individual with stronger incentives to do well at school. Whereas pure consumption of market goods, i.e. consumption activities that do not require any skills, distorts incentives to acquire skills. The latter

effect has been described by Owen (1995) to explain poor academic performance by American youth. They are materially too well off to acquire skills that would bring more meaning to their lives, and have therefore weak incentives to acquire professional skills for two reasons. First, the one mentioned by Owen. Second the one mentioned in this paper, their marginal returns from more material resources will be lower if they do not have skills to produce internal goods. Since, the utility an individual can derive out of his resources depends on how many consumption technologies the individual has access to. Thus the returns from working hard is lower for someone with no hobby skills, than for someone for who has the skills to derive utility from fine furniture, art, architecture, music, literature, sports and so on.

From this one might conclude that schools should teach pupils to play golf but not to teach them to sing. However, complementarity between free and costly skills, provides an argument for endowing them with both sets of skills.

This paper has taken the social capital as given, however, the next step in modelling the value of hobbies and cultural goods would be to include social capital, which would provide an even stronger argument for teaching art and music in school.²⁵

The theory for the existence of cultural goods has one important implication for the modelling of the cultural sector of the economy. This is the fact that ‘cultural goods’ are technologies for the production of an internal good. For example sheet music and musical instruments are complementary technologies for the production of music. This opens up for interesting research on inventing and trading technologies

²⁵There is a related literature on how to make yourself happy by allocating time and money efficiently and raising your productivity potential. See Kendrick and Kendrick (1988)(with a focus on productivity) and Lebergott (1993)(with a focus on consumption). However, neither of those analysed the role played by hobby human capital and the production of internal goods.

for the production of internal goods, where the quality of the final good cannot be controlled by the seller, but entirely depends on the consumers incentive to invest in the skills to enjoy the good.

The existence of cultural goods also has interesting implications for welfare, since the utility individuals can derive from the wealth created by the ‘productive sector’ depends on the existence of such technologies and the extent to which individuals have invested in the skills to benefit from these cultural inventions.²⁶

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²⁶Thus cultural goods do create additional value both in home production and in the market place. Gronau (1973,1977,1980) addressed the problem that home production does not enter the official statistics.

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