Economic Materialism, Cultural Change, and the Transition towards Sustained Growth

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Abstract
This study highlights the role of economic materialism, i.e., the set of values and personality traits that prioritise the pursuit of material goals, as a cultural phenomenon of significance in relation to economic transformation and development. It presents a model that shows why an endogenous cultural change towards more widespread adherence to materialistic values is both a cause and an effect of productivity growth. This cultural-economic complementarity is a powerful mechanism of endogenous productivity growth; it also determines the prevalence of different cultural values vis-à-vis the prominence of material objectives. The model’s calibration reveals that its outcomes offer a reasonably good fit for the differences in the evolution of income per capita in England and France between 1500 and 1880.

Keywords: Economic materialism; Cultural transmission; Productivity; Economic growth
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1 Introduction

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In recent years, a growing body of research employed models that incorporate elements of cultural change to investigate issues pertaining to economic growth and comparative economic development.\(^1\) This literature has already identified the important role of endogenous cultural change for economic activity, with regard to attitudes on corruption (Hauk and Sáez-Martí, 2002); on leisure, patience, and occupational choice (Doepke and Zilibotti, 2008; Klasing and Milionis 2014); on trust (Francois and Zabojnik, 2010); on the esteem attached to different occupations (Corneo and Jeanne, 2010); on entrepreneurship (Chakraborty et al., 2016); on legal institutions (Thompson and Wu, 2018); and on education (Varvarigos, 2020). There is also an abundance of empirically-oriented studies, such as those by Knack and Keefer (1997), Inglehart and Baker (2000), Guiso et al. (2006), Tabellini (2010) and Alesina and Giuliano (2015), who provide evidence on a significant relation between culture and economic development.

One cultural aspect that has eluded the attention of the previously mentioned strand of literature involves the role of **economic materialism**, i.e., the set of values, beliefs, personality traits and attitudes that attach significant importance to the pursuit of material goals, thus promoting the acquisition and consumption of material goods.\(^2\) This oversight is by no means warranted though. On the contrary, it obscures the role of an important cultural factor for economic progress. Even though the choice of self-gratification through material possessions may seem vain and unappealing, the truth is that it provides a strong motivation for improving the means through which people can indulge their predilection for material goods. Put differently, the objective to increase one’s worldly possessions offers an incentive to pursue ventures that increase productivity and, therefore, income; for an economy as a whole, the presence of materialists can boost economic growth through productivity improvements. At the same time, there is every reason to presume that the diffusion and prevalence of cultural values and traits, which differ with regard to their emphasis on material aspirations, are by no means impervious to the economic transformation that occurs in the process of

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\(^1\) Of course, there are seminal studies (e.g., Galor and Weil, 2000) that provide lucid explanations of economic transformation and development, without explicit consideration of cultural factors. See also Galor (2011) and the references therein.

\(^2\) Economic materialism and consumerism are conceptually related. For example, Stearns (2001) defines a consumerist society as one “in which many people formulate their goals in life partly through acquiring goods that they clearly do not need for subsistence” (Stearns, 2001; p. ix).
development. Certainly, one can hardly dispute with the idea that economic progress influences the cultural traits that collectively shape a society's values, customs and norms – the stock of cultural capital to which the traits that form economic materialism belong.

The aforementioned arguments motivate this study. Its objective is to provide a formal, systematic analysis of the idea that a cultural change towards more widespread adherence to economic materialism induces and, in turn, is induced by economic transformation. This underlying complementarity effectuates a powerful mechanism of endogenous productivity growth, and determines the prevalence of cultural values that differ vis-à-vis the prominence of material objectives.

The results and implications are corroborated by ideas and arguments that are solidly grounded on a plethora of both historical and more recent evidence. Indeed, several historians have emphasised the role of the rising, and more widespread, material objectives as both a cause and an effect of the economic take-off in Western Europe, during the 18th and 19th centuries. For example, McKendrick et al. (1982) claimed that a more comprehensive understanding of the circumstances surrounding industrialisation in 18th century England, is possible only in conjunction with the emerging materialist culture in segments of the population around the same period. They argued that the process of industrialisation would not have been the same in the absence of those who wanted “passionately to add to their worldly goods, to develop indeed the appetite of a consumer” (McKendrick et al., 1982; p.327). Stearns (1997) asserted that the economic transformation – manifested in increased manufacturing activity – during that period, ultimately enabled a culture of consumerism; he also alluded to the link between economic materialism and improvements in productivity, through the explicit reference to “the relationship between new material expectations and the motivations for investment in new technologies” (Stearns, 1997; p. 102). According to De Vries (1994), a cultural change towards more materialistic values, which occurred throughout Northwestern Europe, was a precursor to the onset of industrialisation: he claimed that “changes in tastes […] preceded and prepared the way for the Industrial Revolution. This industrious revolution, a change in household behavior with important demand-side features, began in advance of the Industrial Revolution” (De Vries, 1994; p. 256). In a similar vein, Braudel (1992) also
highlighted the role of increased demand for material goods as a significant force of economic evolution, arguing that “if the door is to be opened to innovation, the source of all progress, there must be first some restlessness which may express itself in such trifles as dress, the shape of shoes and hairstyles” (Braudel, 1992; p. 333). The empirical studies of Uhlaner and Turik (2007) and Xu et al. (2019) offer further credence to this study’s underlying implications, as they employ recent data to show evidence that more widespread attitudes of economic materialism are associated with increased innovation.

Methodologically, our model divides the population into two groups that differ in their evaluation of the consumption of material goods for their utilities. Non-materialists only care about the goods they consume. Materialists, on the other hand, have material aspirations, in the sense that they also care about how their standards of living compare to those of their predecessors. In this respect, the model involves aspects of conspicuous consumption in the spirit of Veblen (1899), as it captures circumstances where (some) agents have the innate desire to compare their material possessions against some reference level (e.g., Wendner, 2010; Dioikitopoulos et al., 2020). The distribution of preferences among the population is endogenous; it evolves through an intergenerational transmission of cultural traits à la Bisin and Verdier (2001).³

We show the possibility that, as long as the return to productivity-enhancing activities is sufficiently high, only materialists find optimal to undertake them: Given their preferences, this choice offers them the income necessary to gratify their material aspirations. At the same time, we also show that productivity growth induces more intense cultural instruction in families with materialist parents; consequently, it causes a more widespread adherence to the values and attitudes of economic materialism. Thus, the economy follows a path where the mutually-reinforcing impact of productivity improvements and more widespread adherence to economic materialism, provides the foundation for the take-off towards sustained economic growth, and shapes long-run cultural outcomes in the sense that, gradually, a significant fraction of the population will end up upholding materialistic values.

We also present numerical examples to investigate the quantitative performance of our framework. The model’s calibration shows that it performs reasonably well in

capturing the differences in the evolution of productivity and income per capita between England and France from 1500 to 1880. In this respect, our model’s mechanisms and implications contribute to a better understanding of issues pertaining to comparative economic development.

The remainder of the study is organised as follows: Section 2 presents the set-up of the model economy, while Section 3 shows how different cultural traits affect optimal decisions on consumption and productivity-improving investment. In Section 4, we analyse the process through which different cultural traits are diffused in the population. Section 5 analyses the joint evolution of productivity growth and cultural change, while Section 6 presents the model’s calibration. In Section 7, we conclude.

2 The Economic Environment

An infinite horizon economy is populated by overlapping generations of agents who live for two periods – childhood and adulthood. Each adult agent rears a child, meaning that the economy’s population mass is constant over time. The demographic structure is simplified even further by assuming that each age cohort’s population mass is normalised to 1. As we will see shortly, agents are distinguished by a personality trait, indicated by $j$, which determines their aspirations and attitudes on material possessions.

Consider an agent who is born in period $t$ and who, therefore, becomes an adult in $t+1$. In adulthood, the agent is endowed with the previous generation’s average level of productivity, denoted $a_t$, and with 2 units of time. One of these units is devoted inelastically in the production of goods. With regard to the remaining 1 unit of time, she has the choice to distribute it to different activities. She can spend time in activities that offer utility directly, such as religious and other spiritual practices, as well as recreation and leisure. She can also spend time in ventures that raise her productivity above what she was endowed with – activities such as innovation, learning and research – thus...

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4 Zolfagharian and Ulusoy (2017) find empirical support for the negative relation between religiosity and materialism. Recent evidence shows that religious activity retards innovation (Bénabou et al., 2015) and economic growth (Campante and Yanagizawa-Drott, 2015). For evidence on the trade-off between leisure goods/time and income-generating activities, see Aguiar et al. (2021).
enabling her to increase the output she produces. Each unit of time devoted to such ventures raises her productivity by \( \gamma_{t+1} \). Consequently, if she devotes \( s_{j,t+1} \in [0,1] \) units of time to productivity-improving activities, her overall productivity will be

\[
a_{j,t+1} = a_t(1 + \gamma_{t+1}s_{j,t+1}).
\]  

(1)

The term \( \gamma_{t+1} \) introduces an intragenerational externality in the process of productivity improvements. We consider the presence of learning spillovers according to which, as more agents engage with productivity-enhancing activities, a stock of knowledge is created and flows costlessly across the economy. This idea is corroborated by empirical evidence that supports the existence of such learning spillovers (e.g., Bahk and Gort, 1993; Irwin and Klenow, 1994). To capture this in the simplest possible manner, we denote \( e_{t+1} \) the number of those agents who actively invest time towards improvements in productivity, and assume that \( \gamma_{t+1} = \gamma(e_{t+1}) \) such that

\[
\gamma(e_{t+1}) = \begin{cases} 
\gamma & \text{if } e_{t+1} < \hat{e} \\
\bar{\gamma} & \text{if } e_{t+1} \geq \hat{e}.
\end{cases}
\]  

(2)

where \( \bar{\gamma} > \gamma > 0 \) and \( 0 < \hat{e} < 1 \).

Each agent will produce units of the economy’s good and, therefore, earn income, \( i_{j,t+1} \), according to

\[
i_{j,t+1} = a_{j,t+1}.
\]  

(3)

She uses this income to finance her desired consumption expenditures, i.e.,

\[
c_{j,t+1} = i_{j,t+1}.
\]  

(4)

This set-up reveals the potential utility benefit of productivity improvements, i.e., increased consumption. However, these improvements entail the cost of foregone utility from other activities. An agent’s preferences with regard to these aspects are specified in

\[
u_{j,t+1} = (1-s_{j,t+1})^{1-\theta}[(1-\Phi_j)c_{j,t+1} + \Phi_j(c_{j,t+1} - \bar{c}_{t+1})]^\theta,
\]  

(5)

where \( 0 < \theta < 1, 0 < \Phi_j < 1, \) and \( \bar{c}_{t+1} > 0 \).

The utility function in (5) is indicative of aspirations in the acquisition of material goods, whereby an agent’s utility may not only depend on her own material consumption per se, but also on the difference between her own consumption and a
reference point \( \bar{c}_{t+1} \). In what follows, we will assume that these aspirations are driven by the average income of the previous generation of adults. That is

\[
\bar{c}_{t+1} = i_t. \tag{6}
\]

In contrast to what is customary in models of this sort, however, the parameter that captures the strength of such aspirations, i.e., \( \Phi \) is neither exogenous nor common to all agents. Instead, we are going to treat it as an endogenous cultural characteristic, which agents adopt through a process of cultural transmission. In doing so, we draw on the seminal work of Bisin and Verdier (2001). Before we delve into the details of cultural change, however, we will first present the solution of the problem faced by an agent who decides how to allocate her unit of time. Substituting (1), (3) and (4) in (5), the problem is to choose \( s_{j,t+1} \) in order to maximise

\[
 u_{j,t+1} = (1 - s_{j,t+1})^{1-\theta}\left[a_t(1 + \gamma_{t+1}s_{j,t+1}) - \Phi j\bar{c}_{t+1}\right]. \tag{7}
\]

Given the non-negativity of \( s_{j,t+1} \), and taking account of \( \gamma_{t+1} = \gamma(e_{t+1}) \), it can be easily shown that the solution to the problem is

\[
 s^*_{j,t+1} = \max\left\{0, \frac{\theta\gamma(e_{t+1})a_t - (1 - \theta)(a_t - \Phi j\bar{c}_{t+1})}{\gamma(e_{t+1})a_t}\right\}. \tag{8}
\]

As long as \( s^*_{j,t+1} > 0 \), we see that an agent’s investment towards productivity improvements is positively related to the importance of consumption aspirations for her utility \( \Phi j\bar{c}_{t+1} \). The positive impact of material aspirations on \( s^*_{j,t+1} \) is attributed to the fact that the agent must invest in productivity improvements in order to gain the higher income that is necessary to guarantee that her material consumption will exceed the reference point. As expected, \( s^*_{j,t+1} \) is also increasing in the relative weight of consumption for an agent’s overall utility, i.e., \( \theta \), and on the term that captures the impact of intragenerational learning spillovers, i.e., \( \gamma(e_{t+1}) \). The intuition behind the latter effect is that a higher number of agents who invest in productivity improvements, increases the flow of learning spillovers that facilitate everyone in being more efficient when they invest in productivity-enhancing ventures.

Before we proceed to the next section of our analysis, note that, by virtue of (3), (4) and (6), it follows that
\( \bar{c}_{t+1} = a_t. \)  

(9)

We can substitute (9) in (8) to derive

\[
s_{j,t+1}^* = \max \left\{ 0, \frac{\theta y(e_{t+1}) - (1 - \theta)(1 - \Phi_j)}{y(e_{t+1})} \right\}. \tag{10}
\]

3 Cultural Values, Productivity, and Consumption

There are two cultural traits, determining the extent of an agent’s aspirations on material outcomes (i.e., consumption). Formally,

\[
\Phi_j = \begin{cases} 
\varphi & \text{if } j = M, \\
0 & \text{if } j = N. 
\end{cases} \tag{11}
\]

In other words, Type-M agents have a greater inclination towards actions that improve their material conditions, compared to Type-N ones, because they have aspirations that induce them to acquire more consumption goods. Henceforth, we shall be using \( m_{t+1} \in [0, 1] \) to denote the fraction of adults who have been inculcated with the M trait, meaning that the corresponding fraction \( n_{t+1} \) of those inculcated with the N trait is \( n_{t+1} = 1 - m_{t+1} \). Furthermore, from now on Type-M agents will also be referred to as materialists, whereas Type-N agents will also be referred to as non-materialists.

At this point, we will introduce a technical condition that facilitates the exposition and clarity of the subsequent analysis. Specifically, we impose the following:

Assumption 1. \( \gamma < \frac{(1 - \theta)(1 - \varphi)}{\theta} < \overline{\gamma} < \frac{1 - \theta}{\theta}. \)

Combining Assumption 1 with (2), (10) and (11), it is straightforward to establish that non-materialists will not invest any of their time towards productivity improvements. Even if they anticipate everyone else to invest, the benefits from learning spillovers are not sufficient to induce them to devote any effort to increase their productivity and, therefore, attain a higher level of consumption. Hence, \( s_{N,t+1}^* = 0 \) while, by virtue of (7) and (11), \( u_{N,t+1}^* = a_t^\theta. \)
The previous arguments indicate that the maximum possible number of agents who may invest in productivity improvements is \( m_{t+1} \), i.e., the agents whose preference profile classifies them as materialists. Given Assumption 1 and (2), (10) and (11), however, if \( m_{t+1} < \hat{e} \) the only possible outcome is that none of the Type-\( M \) agents will try to improve their productivity. Similar to the case of Type-\( N \) agents, the benefits from learning spillovers are not sufficient to induce any effort towards productivity-enhancing ventures. Hence, \( s_{M,t+1}^* = 0 \) while, by virtue of (7) and (9) and (11),

\[
u_{M,t+1}^* = [(1-\varphi)a_t]^0.\]

Nevertheless, outcomes may differ if \( m_{t+1} > \hat{e} \). On the one hand, if each Type-\( M \) agent anticipates that none of the other Type-\( M \) agents will invest in productivity improvements, then \( e_{t+1} = 0 < \hat{e} \), meaning that, once more, \( s_{M,t+1}^* = 0 \) and

\[
u_{M,t+1}^* = [(1-\varphi)a_t]^0.\]

On the other hand, however, if each Type-\( M \) agent expects that all other Type-\( M \) agents will invest in productivity improvements, then \( e_{t+1} = m_{t+1} > \hat{e} \). Taking account of Assumption 1 and (2), (10) and (11), it follows that she will also find optimal to devote some time in productivity-enhancing ventures. Hence,

\[
s_{M,t+1}^* = \frac{\theta \hat{y} - (1-\theta)(1-\varphi)}{\hat{y}} > 0 \text{ which, together with (7) and (9) and (11), leads to}
\]

\[
u_{M,t+1}^* = \frac{a_t^\theta (1-\theta)^{1-\theta} \theta^\theta (\hat{y} + 1-\varphi)}{\hat{y}^{1-\theta}}.\]

The key aspect in this case is that the presence of material aspirations offer additional incentives so that, given sufficient learning spillovers, materialists are induced to undertake productivity-enhancing activities, as these are the means through which they can satisfy their predilection for material goods.

Clearly, the aforementioned scenario points to the fact that, when \( m_{t+1} > \hat{e} \), Type-\( M \) agents engage in a symmetric game in which their decisions are strategic complements. As it is well-known (e.g., Cooper and John, 1988) such circumstances can result in indeterminacy due to the emergence of multiple pure strategy Nash equilibria. Generally speaking, this sort of indeterminacy is problematic as it undermines the model’s predictive power. For this reason, we will apply a further refinement concept to ensure that a unique equilibrium will prevail in each repetition of this game by successive generations of Type-\( M \) agents. This refinement concept has to do with the fact that, when multiple Nash equilibria emerge under \( m_{t+1} > \hat{e} \), they can be Pareto
ranked. Indeed, it is straightforward to establish that
\[
\frac{a_i^\theta (1-\theta)^{1-\theta} \theta^\phi (\bar{y} + 1 - \phi)}{\bar{y}^{1-\theta}} > [(1-\phi) a_i]^{\varphi}\n\]
for \(\bar{y} > \frac{(1-\theta)(1-\phi)}{\theta}\). This also means that the choice of investment towards increased productivity is efficient as it maximises the sum of Type-M agents’ payoffs. Furthermore, note that, under these circumstances, the decision to invest in productivity improvements has the characteristics of a weakly dominant strategy: On the one hand, if an agent anticipates that everyone else will devote time for productivity improvements, she will clearly be better-off doing the same; on the other hand, and in light of the non-negativity constraint on \(s_{M,t+1}\), if she anticipates that no one else will invest towards improving their productivity, the agent will not experience any difference in utility by considering either to invest or not. Even if she considers such investment, the low productivity of her project will induce her to abandon it.

Given the above, we will assume that, when \(m_{t+1} \geq \hat{e}\), Type-M agents will be rational enough to assess that it will be to everyone’s benefit to pursue productivity-enhancing ventures, and that all her peers think similarly; hence, all Type-M agents will choose \(s_{M,t+1}^* > 0\) in this case. With these arguments in mind, we can summarise the outcomes regarding the agents’ optimal decisions through

**Lemma 1.** Under Assumption 1,

\[
s_{N,t+1}^* = 0, \quad (12)
\]

\[
s_{M,t+1}^* = \begin{cases} 
0 & \text{if } m_{t+1} < \hat{e} \\
\frac{\theta \bar{y} - (1-\theta)(1-\phi)}{\bar{y}} & \text{if } m_{t+1} \geq \hat{e}.
\end{cases} \quad (13)
\]

*Proof.* It follows from the preceding analysis and discussion. \(\Box\)

The results in Lemma 1 can be combined with (1)-(2) to determine the level of productivity under which each agent will produce goods. That is,
\[ a_{j,t+1}^* = \begin{cases} 
    a_t & \text{if } j = N \\
    a_t [\theta (\overline{y} + 1 - \varphi) + \varphi] & \text{for } m_{t+1} < \hat{e} \\
    a_t [\theta (\overline{y} + 1 - \varphi) + \varphi] & \text{for } m_{t+1} \geq \hat{e} \end{cases} \quad \text{(14)} \]

As we indicated previously, and can be verified by substituting the results in Lemma 1, together with (2) and (9), in (7), the indirect utility of a non-materialist is,

\[ u_{N,t+1}^* = a_t^\theta, \quad \text{(15)} \]

whereas a materialist’s indirect utility is

\[ u_{M,t+1}^* = \begin{cases} 
    \left( (1 - \varphi) a_t \right)^\theta & \text{if } m_{t+1} < \hat{e} \\
    \frac{a_t^\theta (1 - \theta)^{1 - \theta} \theta^\theta (\overline{y} + 1 - \varphi)}{\overline{y}^{1 - \theta}} & \text{if } m_{t+1} \geq \hat{e} \end{cases} \quad \text{(16)} \]

4 The Intergenerational Transmission of Cultural Values

Agents adopt their cultural values and attitudes in childhood, and carry them for their rest of their lives. Each agent’s cultural type is endogenously determined through a process of cultural transmission. Parents undertake activities, such as cultural instruction and socialisation, with the purpose of instilling the values and attitudes that ultimately determine their offspring’s preference parameter \( \Phi_j \). As will become clear below, parents will have the desire to instil their own cultural trait in their children. This is because they are not altruistic in the pure sense of the word. Instead, they use their own preferences to assess the decisions of agents that belong to their own age group, and use this assessment as the benchmark to evaluate the decisions that will better serve their children in adulthood. Furthermore, they are also driven by a ‘selfish’ motive in the sense that having children who adopt the same values and attitudes as theirs, is also a source of utility. These ideas are consistent the application of cultural transmission in Bisin and Verdier (2001), Francois and Zabojnik (2010) and Klasing and Milionis (2014) among others.

Let us consider the parents of those agents on whom the analysis was focused so far, i.e., the parents of agents who reach adulthood in \( t + 1 \). Put differently, let us consider agents who are adults in \( t \) and focus on their parental roles as cultural
instructors. A Type- \( j \) parent will instil her own trait in her child with probability \( p_{j,t} \), as long as she devotes \( P(p_{j,t}) \geq 0 \) units of effort towards her offspring’s cultural instruction:

This is the direct (or vertical) element of the cultural transmission process. The parent’s effort is characterised by a twice continuously differentiable function, such that \( P(0) = 0 \) and \( P'(p_{j,t}), P''(p_{j,t}) > 0 \). If the parent is not successful in instilling her own trait, the child will form her cultural values and attitudes through socialisation and cultural instruction outside the family environment. Specifically, she will adopt the cultural trait of a ‘role model’ (e.g., a teacher, a spiritual or political leader, a family acquaintance etc.) who she will pick out of the population of adults in \( t \): This is the indirect (or oblique) element of the cultural transmission process.

Define the function \( b(m_t) \in [0,1] \), where \( b'(m_t) > 0 \), \( b(0) = 0 \) and \( b(1) = 1 \), as the likelihood that a child born to a Type- \( j \) \( (j = \{M,N\}) \) parent, but who adopts her trait through the oblique transmission, picks a role model who adheres to the \( M \) trait. It follows that the probability that the child will adopt her parent’s cultural trait is

\[
\pi_{M,t} = p_{M,t} + (1-p_{M,t})b(m_t),
\]

for children born to materialist parents, and

\[
\pi_{N,t} = p_{N,t} + (1-p_{N,t})[1-b(m_t)],
\]

for children born to non-materialist parents. By the law of large numbers, the population mass of adults who will uphold materialistic values in \( t + 1 \) is

\[
m_{t+1} = \pi_{M,t}m_t + (1-\pi_{N,t})(1-m_t).
\]

As we argued previously, parents use their own cultural values and attitudes, manifested in their preference characteristic \( \Phi_j \), and, given these values and attitudes, their corresponding assessment of the average utility of agents who belong to the same generation. These serve as the means of evaluating the implications of different choices for a person’s welfare. It is this process that helps parents to infer which choices will better serve their children in adulthood, and, therefore, to decide how much effort to devote in instilling the cultural trait that ensures that their children will eventually make these choices. Their efforts are also informed by their desire to have children who, as
adults, will share their parents’ values and attitudes. Specifically, a Type- \( j \) parent will enjoy an additional ‘payoff’ \( f_j > 0 \) if her offspring adopts the same cultural trait.

Let \( \psi_{j,M,t} \) be the average utility of a time- \( t \) adult, whose time allocation decision is consistent with the \( j \) trait, but evaluated from the Type- \( M \) adult’s viewpoint, i.e., under \( \Phi_{M} = \psi \); this is also a Type- \( M \) parent’s additional perceived payoff from her offspring’s adoption of materialistic values (if \( j = M \)) or non-materialistic ones (if \( j = N \)). Similarly, let \( \psi_{j,N,t} \) be the average utility of a time- \( t \) adult, whose time allocation decision is consistent with the \( j \) trait, but evaluated from the Type- \( N \) adult’s viewpoint, i.e., under \( \Phi_{N} = 0 \); this is also a Type- \( N \) parent’s additional perceived payoff from her offspring’s adoption of non-materialistic values (if \( j = N \)) or materialistic ones (if \( j = M \)). It follows that materialist parents will choose \( p_{M,t} \) to maximise their own expected payoff, depending on their children’s adopted trait. That is,

\[
\pi_{M,t}(\psi_{M,M,t} + f_M) + (1 - \pi_{M,t})\psi_{N,M,t} - P(p_{M,t}).
\] (20)

Similarly, non-materialist parents will choose \( p_{N,t} \) to maximise their own expected payoff, depending on their children’s adopted trait:

\[
\pi_{N,t}(\psi_{N,N,t} + f_N) + (1 - \pi_{N,t})\psi_{M,N,t} - P(p_{N,t}).
\] (21)

To facilitate the exposition of the subsequent analysis, we follow others (e.g., Bisin and Verdier, 2001) in adopting a quadratic form for the convex effort cost of cultural instruction:

\[
P(p_{j,t}) = \kappa \frac{p_{j,t}^2}{2}, \quad \kappa > 0.
\] (22)

Taking account of (17), (18), (22) and the non-negativity of \( p_{j,t} \), the solutions to the problems of materialist and non-materialist parents are given by

\[
p^{*}_{M,t} = \max \left\{ 0, \frac{[1 - b(m_t)](f_M + \psi_{M,M,t} - \psi_{N,M,t})}{\kappa} \right\},
\] (23)

\[
p^{*}_{N,t} = \max \left\{ 0, \frac{b(m_t)(f_N + \psi_{N,N,t} - \psi_{M,N,t})}{\kappa} \right\},
\] (24)

where \( \kappa \geq \max\{f_M + \psi_{M,M,t} - \psi_{N,M,t}, f_N + \psi_{N,N,t} - \psi_{M,N,t}\} \) is assumed to ensure that \( p^{*}_{M,t}, p^{*}_{N,t} \leq 1 \), since both these variables are probabilities.
The solutions in (23)-(24) allow us to make the following observations: First, parents will undertake a more intense cultural instruction of their children, when their perceived difference between the average utility from choices that are consistent with the cultural values to which they conform, and the average utility from choices that are incompatible with their own values, becomes larger. Second, the desire to have culturally similar children is also a factor that intensifies their efforts towards cultural instruction. Third, the size of the population who share the parents’ cultural values is a substitute to parents’ own efforts to instil these values in their children – formally, \( \frac{\partial p^*_M}{\partial m} < 0 \) and \( \frac{\partial p^*_N}{\partial m} > 0 \). This is an outcome that Bisin and Verdier (2001, 2008) referred to as ‘cultural substitution’, and it is typical in models of this sort. It is quite intuitive as well: Parents will be less inclined to incur the effort cost for achieving an outcome that becomes more likely through cultural instruction that occurs outside the family environment.

Now, let us specify the terms \( \psi_{M,M,t} \), \( \psi_{N,M,t} \), \( \psi_{N,N,t} \), and \( \psi_{M,N,t} \). By virtue of (15) and a rearrangement of (16) we have
\[
\psi_{M,M,t} = \mu_{M,t}^* = \begin{cases} 
[(1-\phi)a_{t-1}]^\theta & \text{if } m_t < \hat{e} \\
[(1-\phi)a_{t-1}]^\theta \left(1+\frac{\bar{r}}{1-\phi}\right)\left(\frac{\bar{r}}{1-\phi}\right)^{(1-\theta)} & \text{if } m_t \geq \hat{e}
\end{cases}
\] (25)

and
\[
\psi_{N,N,t} = \mu_{N,t}^* = a_{t-1}^\theta.
\] (26)

The term \( \psi_{N,M,t} \) is the one that corresponds to the choice of \( s_{N,t}^* \), but evaluated, in terms of utility, under \( \Phi_M = \phi \). Analogously, the term \( \psi_{M,N,t} \) is the one that corresponds to the choice of \( s_{M,t}^* \), but evaluated, in terms of utility, under \( \Phi_N = 0 \). Therefore, we can combine (7), (9), (12) and (13) as the guide to derive
\[
\psi_{N,M,t} = [(1-\phi)a_{t-1}]^\theta,
\] (27)

and
\[
\psi_{M,N,t} = \begin{cases} 
a_{t-1}^\theta & \text{if } m_t < \hat{e} \\
[(1-\phi)a_{t-1}]^\theta \left(1+\frac{1-\phi}{\bar{r}}\right)^{1-\theta} \left[\frac{\phi}{\theta(1-\phi)}+1+\frac{\bar{r}}{1-\phi}\right]^{\theta} & \text{if } m_t \geq \hat{e}
\end{cases}
\] (28)
Now, let us examine the implications for parental efforts towards their children’s cultural indoctrination. We begin by defining the composite terms

\[
\mu = (1 - \phi)^{\theta} (1 - \theta)^{1 - \theta} \theta \left[ 1 + \frac{\theta}{1 - \phi} \left( \frac{\theta}{1 - \phi} \right)^{(1 - \theta)} - 1 \right],
\]

(29)

\[
\nu = 1 - (1 - \phi)^{\theta} (1 - \theta)^{1 - \theta} \theta \left[ \frac{\phi}{\theta(1 - \phi)} + 1 + \frac{\theta}{1 - \phi} \right]^{\gamma},
\]

(30)

for which we present the result that comes in the form of

**Lemma 2.** Under Assumption 1, it is \( \mu, \nu > 0 \).

*Proof. See Appendix A.1. □*

Next, we combine the expressions in (25)-(30) and substitute them in (23) and (24) to get

\[
p_{M,t}^* = \begin{cases} 
\frac{[1 - b(m_t)]f_M}{\kappa} & \text{if } m_t < \hat{e} \\
\frac{[1 - b(m_t)](f_M + a_{i-1}\mu)}{\kappa} & \text{if } m_t \geq \hat{e} 
\end{cases}.
\]

(31)

and

\[
p_{N,t}^* = \begin{cases} 
\frac{b(m_t)f_N}{\kappa} & \text{if } m_t < \hat{e} \\
\frac{b(m_t)(f_N + a_{i-1}\nu)}{\kappa} & \text{if } m_t \geq \hat{e} 
\end{cases}.
\]

(32)

The expressions in (31)-(32) lead to the following result:

**Lemma 3.** For \( m_t \geq \hat{e} \), it is \( \frac{\partial p_{M,t}^*}{\partial a_{i-1}}, \frac{\partial p_{N,t}^*}{\partial a_{i-1}} > 0 \).

*Proof. It is straightforward to establish that \( \frac{\partial p_{M,t}^*}{\partial a_{i-1}} = \frac{[1 - b(m_t)]b a_{i-1}\mu}{\kappa} > 0 \) and \( \frac{\partial p_{N,t}^*}{\partial a_{i-1}} = \frac{b(m_t)b a_{i-1}\nu}{\kappa} > 0 \). □*
When there is a lack of sufficient number of materialists, all adult parents make the same economic decisions: Irrespective of their different viewpoints, i.e., the different importance they attach to their material conditions, the return to productivity-enhancing investment is low enough to deter everyone from undertaking it. Even Type-\(M\) agents find optimal to compromise, thus accepting a relatively low level of consumption, exactly like Type-\(N\) agents do. Consequently, parents cannot perceive any differences in utility, which will induce them to intensify their children’s indoctrination towards their own cultural values; the only reason why they devote any effort towards cultural indoctrination is simply because of their desire to have culturally similar children. The outcomes differ, however, when the number of those who can potentially invest in productivity improvements (i.e., the materialists) is enough to induce sufficiently high benefits from learning spillovers. Now, different cultural values and attitudes are manifested in different decisions. Contrary to non-materialistic agents, materialists undertake ventures that will ultimately allow them to satisfy their greater desire for material goods. Therefore, there is a wedge in parents’ perceptions of the different utilities associated with correspondingly different decisions – a wedge that unavoidably leans in favour of the cultural trait that parents adhere to. Thus, they intensify their efforts to instil this trait in their children. Interestingly, higher productivity prompts parents of both types to intensify the cultural instruction of their offspring. This is an intuitive result however: No matter what a parent’s cultural trait is, higher productivity and income amplify the gap between what she perceives as being optimal, from her point of view, and what she perceives as being the alternative.

5 Productivity Growth and Cultural Change

In this section, we will present and analyse the joint evolution of productivity growth and cultural change, as well as the implications for the economy’s long-term prospects. First, consider the dynamics of productivity. Using (1)-(2) and taking account that the number of those actively engaged in the process of productivity improvements \(e_{t+1}\) is either 0 or equal to the number of agents who uphold materialistic preferences, i.e., \(m_{t+1}\),
average productivity is \( a_{t+1} = a_t \) if \( m_{t+1} < \hat{v} \) and \( a_{t+1} = a_t (1 + \gamma_{t+1} m_{t+1} s_{M_{t+1}}^*) \) if \( m_{t+1} \geq \hat{v} \). For expositional purposes, let us define the transformed variable

\[
m_{t+1} = v_t. \tag{33}
\]

Of course, \( m = v \) in the steady state, meaning that \( v_t \) also measures the share of materialists in the population. Combining (13) and (33), it follows that average productivity evolves according to

\[
a_{t+1} = \begin{cases} a_t & \text{if } v_t < \hat{v} \\ a_t \{1 + v_t [\bar{\theta} - (1 - \theta)(1 - \varphi)]\} & \text{if } v_t \geq \hat{v}. \end{cases} \tag{34}
\]

It will also be instructive to express (34) in terms of the growth rate of productivity

\[
g_{t+1} = \frac{a_{t+1}}{a_t} - 1. \tag{35}
\]

The preceding analysis allows us to infer the critical role of cultural factors for the economy’s prospects towards increased productivity. This is formally presented in

**Proposition 1.** Economic transformation, occurring through the onset of productivity growth, is possible only if there is a critical mass of materialists, i.e., agents who attach high importance to their material conditions because of their aspirations.

*Proof.* By virtue of Assumption 1, it is \( \bar{\theta} - (1 - \theta)(1 - \varphi) > 0 \). Consequently, the result follows from the expressions in (33) and (35). \( \square \)

This result is quite intuitive. The benefits offered by learning spillovers are sufficient to induce productivity-enhancing investments only to those agents whose decisions are partly driven by the strength of their consumption aspirations, captured by \( \varphi \). In light of this outcome, productivity growth is a process driven by the activities of these agents, i.e., the materialists.

Now, consider the dynamics of cultural change. We begin by specifying the function \( b(m_i) \), i.e., the likelihood that a child who adopts her trait through cultural
instruction outside the family, picks a role model who adheres to the values of economic materialism. Particularly, we consider the following:

\[ b(m_t) = m_t. \]  

Indeed, the specification in (36) is what the majority of studies typically assume (e.g., Bisin and Verdier, 2001).

Combining (17)-(19) and (36), we can show that

\[ m_{t+1} = m_t [1 + (1 - m_t) (p_{Mt}^* - p_{Nt}^*)]. \]

We can combine these results with (31), (32) and (36), and use the transformed variable of (33) to express the dynamics of cultural change, captured by the evolution of materialistic preferences in the population. Formally,

\[
v_{t+1} = \begin{cases} 
  v_t \left[ 1 + (1 - v_t) \frac{1 - v_t}{f_M - v_t f_N} \right] & \text{if } v_t < \hat{e} \\
v_t \left[ 1 + (1 - v_t) \frac{1 - v_t (f_M + a_i \mu - v_t (f_N + a_i \nu))}{f_M - v_t f_N} \right] & \text{if } v_t \geq \hat{e} 
\end{cases} \]

(37)

It will useful to express (37) in terms of the change in the number of materialists in the population, i.e., \( \Delta v_{t+1} = v_{t+1} - v_t \). That is

\[
\Delta v_{t+1} = \begin{cases} 
  > 0 & \text{for } v_t < \tilde{b} \text{ if } v_t < \hat{e} \\
  < 0 & \text{for } v_t > \tilde{b} \text{ if } v_t < \hat{e} \\
  > 0 & \text{for } v_t < \overline{b}_t \text{ if } v_t \geq \hat{e} \\
  < 0 & \text{for } v_t > \overline{b}_t \text{ if } v_t \geq \hat{e}
\end{cases}
\]

(38)

where

\[
\tilde{b} = \frac{f_M}{f_M + f_N},
\]

(39)

and

\[
\overline{b}_t = \frac{f_M + a_i \mu}{f_M + f_N + a_i \nu (\mu + \nu)}.
\]

(40)

We will pursue the analysis under a scenario where, in terms of how Type-M parents perceive the benefits of their offspring’s cultural instruction relative to Type-N ones, the relative utility differences that emanate from different levels of consumption exceed the relative ‘payoffs’ that emanate from nurturing children that are culturally similar to them. This is a reasonable scenario, as it means that, in the context of
socialisation and cultural instruction, considerations that relate to their children’s material circumstances are relatively more important for Type-\textit{M} parents, compared to Type-\textit{N} ones. This case is formalised through

\textbf{Assumption 2.} \( \frac{H}{f_M} > \frac{V}{f_N} \).

With this in mind, we can present the result in

\textbf{Lemma 4.} \textit{Under Assumption 2, it is} \( \frac{\partial \nu}{\partial \alpha_t} > 0 \) \textit{and} \( \bar{\nu}_i > \bar{\varnothing} \).

\textit{Proof.} See Appendix A.2. \( \square \)

We can utilise these results to infer the impact of productivity growth on the evolution of the distribution of cultural traits among the population. This is something we do in

\textbf{Proposition 2.} \textit{Productivity growth promotes a cultural change towards more widespread adherence to materialistic values.}

\textit{Proof.} It follows from Lemma 4. \( \square \)

Of course, this is an outcome that is intuitive, once we account for the preceding results and discussion. When the number of Type-\textit{M} agents is below the critical threshold \( \hat{e} \), no agent finds optimal to invest in productivity-enhancing activities, irrespective of her type, meaning that parents do not perceive any potential differences in their children’s utility that will emanate from consumption. The only reason why they devote any effort in instilling their own cultural values in their offspring is simply because of their desire to raise children that will be culturally similar to them. Under such circumstances, and if \( \nu_0 < \bar{\varnothing} < \hat{e} \), the number of potential investors, i.e., the materialists, would never exceed the critical threshold necessary to induce productivity-
enhancing efforts. The distribution of cultural values among the population would converge to a long-run equilibrium where the number of agents who adhere to materialistic values is $\bar{o}$. If $\bar{o} > \hat{o}$, however, the critical threshold can be exceeded, meaning that materialists will have sufficient incentives to invest towards productivity improvements. Type-$M$ parents are more sensitive to perceived differences in their offspring’s utility that emanate from differences in the level of material possessions that they can afford. Therefore, they intensify their efforts to inculcate their children with materialistic attitudes; this is the reason why higher productivity and income lead to a higher fraction of materialists in the population, i.e., $\bar{o} > o$.

The previous arguments can direct us to the following result, which will be essential in our understanding of the model’s implications:

**Proposition 3.** There is a cultural-economic complementarity, in the sense that productivity growth and a cultural change towards a more widespread adherence to economic materialism, are mutually reinforcing.

**Proof.** It follows from the preceding analysis and discussion. $\square$

Now we can turn our attention to the economy’s transition from an initial stage of development towards its long-term outcomes. With the previous discussion in mind, it is meaningful to do this under

**Assumption 3.** $\bar{o} > \hat{o}$.

The technical aspects of the long-term equilibrium outcomes are summarised below:

**Lemma 5.** Consider an initial pair $a_0$ and $\nu_0$. Under Assumption 3, the long-run equilibrium is characterised by $v^* = m^* = \frac{\mu}{\mu + \nu}$ and a sustained productivity growth rate $g^* = \frac{\mu}{\mu + \nu}[(1 - \theta)(1 - \varphi) - 1] > 0$. 


Proof. See Appendix A.3. □

At this point, we are equipped with the results necessary to identify the dynamic path that the economy will follow in terms of the joint determination of productivity growth and cultural change. This is done below:

**Proposition 4.** The complementarity between productivity improvements and adherence to materialistic goals facilitates the process of economic transformation. It allows the economy to escape stagnation and to sustain a path of income expansion.

*Proof.* It follows from Lemma 5. □

The dynamics are generated by the planar system of difference equation in (34) and (38) – the latter being, in turn, derived from (37). These dynamics are illustrated on the phase diagram of Figure 1. Let us consider an economy with a pair of initial conditions $a_0$ and $\nu_0 < \hat{\nu} < \bar{\nu}$. At the initial stages, and despite the increase of the share of materialists in the population – a share that is attracted towards $\bar{\nu}$ – the economy remains stagnant, as the level of productivity is constant at $a_0$. This is because there is no critical mass of potential investors whose activities can contribute to widespread

**Figure 1.** The phase diagram.
gains in knowledge of how to improve the efficiency of productivity-enhancing ventures. At some point, however, the share of materialists will exceed the threshold \( \hat{e} \). In light of the potential learning spillovers, those who possess material aspirations have enough incentives to devote resources towards productivity improvements. Hereafter, the two-way causal relation between adherence to materialistic values and economic activity leads to a further increase in the number of agents with stronger aspirations for material goals, whereas the economy’s average income grows due to the sustained rise of average productivity.

6 The Slow Transition to Sustained Growth: A Numerical Study

This section aims to support and complement our analytical results with a numerical example. Our aim is to show how cultural traits, related to materialist preferences, can explain historically observed variations in the magnitude of productivity growth.

In our first example, we examine the effect of material aspirations on productivity growth, as captured by the parameter \( \varphi \) in our model. Recall that \( \varphi \) measures the extent to which materialist agents compare their levels of consumption against a social reference point. In light of this, our analysis will adopt a measure of individualism – proposed by Hofstede (1991) and adopted by Galor and Özak (2016) – as a proxy for the strength of material aspirations. To justify this approach, we allude to Gorodnichenko and Roland (2011) who argue that, by emphasising personal freedom and achievement, individualism involves activities that confer social status, as it encourages individuals to stand out through the display of their personal accomplishments. This comes in stark contrast to collectivism, which by inducing conformity, as well as loyalty and respect for one’s superiors, it discourages individuals from activities that would allow them to stand out from the rest. In fact, cross-cultural psychologists consider the distinction between individualism and collectivism to be the main dimension of cultural variations across countries (e.g., Heine and Hamamura, 2007). Based on these arguments, we relate our model’s measure of material aspirations
(i.e., the parameter $\varphi$) to an empirical proxy of individualism. Recall that a key mechanism of the model is that a higher $\varphi$ encourages investments towards technological improvements, which, in turn, drive productivity growth. Thus, a first step is to examine if the data accommodates the idea of a historical, deeply rooted correlation between individualism and technological sophistication. To this end, we use data from Hofstede (2001) and Galor and Özak (2016) to investigate the correlation between technological sophistication in 1500 and individualism.

The data are presented in Figure 2, in which we can see a positive correlation. This accords with the implications of our model. It should also be emphasized that England, i.e., the country with the highest correlation between individualism and technological sophistication, is also the country that entered the regime of modern economic growth earlier in the sample – again, an outcome that is in line with our model’s mechanisms and predictions.

Next, we turn our attention to the quantitative performance of the model. To do this, we consider two countries – in this case England and France – for which we assume that structural parameters are the same, apart for the strength of material aspirations. Specifically, we assume that the strength of such aspirations is higher in England (i.e., $\varphi = 0.3$) compared to France (i.e., $\varphi = 0.1$). Similar to the approach of Galor and Özak (2016), we set the initial (i.e., the year 1500) value for England’s productivity at $a_0 = 1$, and...
whereas the initial value for France is set at $a_0 = 0.95$. We also set $\theta = 0.708$, $\bar{v} = 0.41$ to calibrate England’s ‘steady-state’ (in this case, the year 1880) productivity growth rate of 4%, which is consistent with the time series productivity data by Clark (2010). Furthermore, we set $v_0 = 0.01 < \hat{\epsilon} = 0.1$ to replicate the stagnation phase we observe in the data (e.g., Maddison, 2006; Clark, 2010). Finally, we set $f_M = f_N = 0.2$ and $\kappa = 0.3$ to generate dynamics such that the England’s early take-off occurs in around 1660, while convergence to the steady state occurs in 1880. Given these, our approach is to calibrate the model to the empirical data for England and France, thus comparing the dynamics and historical economic performance of two countries that differ with respect to the relative strength of material aspirations.

![Figure 3. Materialism and Economic Dynamics: England and France](image)

The dynamics of our analysis is presented in Figure 3. We can see that both countries begin with a phase of stagnation, as observed in the data (e.g., Maddison, 2006). Once the take-off occurs, productivity in England increases at a higher rate compared to France. This outcome can be explained as follows: Stronger material aspirations induce a gradual increase in the share of materialists – a process that, by

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5 The differential dynamics that our model produces do not depend on our choice for the initial values of productivity. We use different initial conditions for each country to be closer to the empirical data.

6 The time series of productivity (Clark, 2010) and income per capita (Maddison, 2006) are normalised to the level of productivity in 1550 and level of income per capita in 1500 respectively.
virtue of Proposition 3, reinforces the complementarity between productivity improvements and the wider adoption of materialistic preferences among the population. Although this may not be particularly noticeable from the scaling of our upper right panel of Figure 3, the share of materialists is higher in England compared to France. In the upper left panel of Figure 3, we can see that our model provides a good fit for the productivity increase observed in England. Furthermore, the bottom right panel of Figure 3 reveals that the differences in the dynamics of productivity and income per capita between the two countries resemble the differences we observe in the data (e.g., Maddison, 2006).

It should be noted that, by virtue of setting the same $f_M$ and $f_N$ for both countries, their timing of the take-off towards sustained growth is the same. Naturally, one can surmise that a country in which the culture of materialism is more pervasive, is also a country in which $f_M$ is higher in relation to $f_N$. In this case, the calibrated version of our model would replicate the England’s earlier timing of the take-off. In this respect, our model opens up a wide avenue for future research on the effect of culture on comparative economic development.

7 Conclusions

This paper aimed at contributing to the burgeoning literature of studies that offer a cultural dimension to issues of comparative economic development. We presented a framework whose analysis demonstrated that a cultural change towards more widespread adherence to materialistic values is both the cause and the effect of productivity improvements and, therefore, sustained economic growth. The model’s mechanisms suggest that the gradual establishment of material aspirations among the population can instigate a transition from stagnation to economic growth. Our numerical analysis demonstrated that these mechanisms can offer a reasonable account for the differentials in productivity and income between England and France from 1500 to 1880.
References


**Appendix**

**A.1 Proof of Lemma 2**

By virtue of Assumption 1, the minimum possible value for \( \bar{y} \) is \( \bar{y}_{\text{min}} = \frac{(1-\theta)(1-\varphi)}{\theta} \).

Using Eq. (29), it is straightforward to establish that \( \mu = 0 \) for \( \bar{y} = \bar{y}_{\text{min}} \), and that the sign of the derivative \( \frac{\partial \mu}{\partial \bar{y}} \) depends on the sign of the expression

\[
\frac{\bar{y}^{-(1-\theta)}}{1-\varphi \left[ 1 - (1-\theta) \left( \frac{1-\varphi}{\bar{y}} + 1 \right) \right]}.
\]  

(A1)

The expression in (A1) is strictly positive under Assumption 1, thus verifying that \( \mu > 0 \).

Next, we can substitute \( \bar{y} = \bar{y}_{\text{min}} \) in Eq. (30) to verify that \( \nu = 0 \). Subsequently, it is straightforward to show that the sign of the derivative \( \frac{\partial \nu}{\partial \bar{y}} \) depends on the sign of the expression

\[
\xi(\bar{y}) = \frac{\varphi(1-\theta)}{\theta} - \left[ \bar{y}^{\theta} - (1-\varphi)(1-\theta) \right] \left( 1 + \frac{\bar{y}}{1-\varphi} \right).
\]  

(A2)

From (A2), we can see that \( \xi(\bar{y}_{\text{min}}) = 0 \) and \( \xi'(\bar{y}) < 0 \). Furthermore, the maximum possible value for \( \bar{y} \) under Assumption 1 is \( \bar{y}_{\text{max}} = \frac{1-\theta}{\theta} \). Substituting this in (A2) yields

\[
\xi(\bar{y}_{\text{max}}) = \frac{\varphi(1-\theta)^2}{\theta(1-\varphi)} < 0,
\]

thus revealing that there exists \( \bar{y}^* \in (\bar{y}_{\text{min}}, \bar{y}_{\text{max}}) \) such that

\[
\frac{\partial \nu}{\partial \bar{y}} > 0 \text{ if } \bar{y} < \bar{y}^* \quad \text{and} \quad \frac{\partial \nu}{\partial \bar{y}} < 0 \text{ if } \bar{y} > \bar{y}^*.
\]

It follows that for \( \nu > 0 \ \forall \ \bar{y} \), it is sufficient to show that \( \nu \geq 0 \) when evaluated at \( \bar{y}_{\text{max}} \). Substitution in (30) yields
\[ \nu(\bar{\nu}_{\text{max}}) = 1 - (1 - \varphi \theta)^{-\delta}(1 + \varphi(1 - \theta))^\vartheta, \quad (A3) \]
from which we can note that, when evaluated at \( \varphi = 0 \), (A3) yields \( \nu(\bar{\nu}_{\text{max}}; \varphi = 0) = 0 \).

Therefore, it is sufficient to show that \( \frac{\partial \nu(\bar{\nu}_{\text{max}})}{\partial \varphi} > 0 \). Indeed, using (A3) we can establish that

\[ \frac{\partial \nu(\bar{\nu}_{\text{max}})}{\partial \varphi} = (1 - \theta)\varphi(1 - \varphi + \theta)(1 - \varphi \theta)^{-\delta}[1 + \varphi(1 - \theta)]^{\vartheta - 1} > 0, \quad (A4) \]

thus completing the proof. \( \Box \)

A.2 Proof of Lemma 4

Differentiate Eq. (40) to get

\[ \frac{\partial \theta_i}{\partial \alpha_i} = \theta_\alpha \alpha_i^{-1} \frac{\theta[f_M + f_N + \alpha_i^\delta(\mu + \nu)] - (\mu + \nu)(f_M + \alpha_i^\delta \mu)}{[f_M + f_N + \alpha_i^\delta(\mu + \nu)]^2}. \quad (A5) \]

Obviously, for (A5) to be positive the following has to hold:

\[ \mu[f_M + f_N + \alpha_i^\delta(\mu + \nu)] > (\mu + \nu)(f_M + \alpha_i^\delta \mu) \Rightarrow \]

\[ \mu f_N > \nu f_M \Rightarrow \]

\[ \frac{\mu}{f_M} > \frac{\nu}{f_N}, \]

which is true by virtue of Assumption 2. Now, compare (39) and (40) see that \( \bar{\nu}_i(a_t = 0) = \bar{\nu} \). Since \( \frac{\partial \bar{\nu}}{\partial \alpha_i} > 0 \), it follows that \( \bar{\nu}_i > \bar{\nu} \). \( \Box \)

A.3 Proof of Lemma 5

Given Assumption 3 and \( \bar{\nu}_i > \bar{\nu} \) (see Lemma 4), the share of agents who uphold materialistic values will eventually exceed \( \hat{\nu} \). When this happens, the variable \( \alpha_i \) will be growing at a positive rate over time (see Eq. 35), meaning that \( \lim_{t \to +\infty} \alpha_i = +\infty \). Combining (33) and (40), it follows that
\[ m^* = v^* = \lim_{\alpha \to +\infty} \frac{f_M + \alpha \mu}{f_M + f_N + \alpha \mu} = \frac{\mu}{\mu + \nu}. \quad (A6) \]

Substituting (A6) in (35), and denoting the long-run growth rate by \( g^* \), yields

\[ g^* = \frac{\mu}{\mu + \nu} [\bar{\theta} - (1 - \theta)(1 - \varphi)]. \quad \square \]