Upward-Flowing Intergenerational Transfers in Economic Development: The Role of Family Ties and their Cultural Transmission

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Abstract

I construct a model where upward-flowing income transfers, from adult children to their old parents, are driven by a culture of strong family ties. This evolves intergenerationally, through a process of cultural transmission. The two-way causal link between economic and cultural change can be a strong enough force to offset cultural substitution, thus generating path-dependent outcomes. These outcomes are consistent with empirical evidence showing that economic development is negatively related with upward-flowing intergenerational transfers, and with the strength of family ties. On the one hand, the economy may follow a convergence path towards a low level of economic development, where adherence to strong family ties is the dominant characteristic of a culturally homogeneous population, and where the overall flow of intergenerational transfers is substantial. On the other hand, the economy may follow a different path of convergence towards a relatively higher level of economic development, where the population is more diverse in terms of their attitudes on family ties, and where the overall flow of intergenerational transfers is lower by comparison.

Keywords: Economic development; Intergenerational transfers; Family ties; Cultural Transmission

JEL Classification: D64; O1; O41; Z1

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"Let them learn first to shew piety at home, and to requite their parents: for that is good and acceptable before God."

1 Timothy 5:4, King James Bible

1 Introduction

The subject of private intergenerational transfers has gained momentum in the analysis of economic growth and development. However, the vast majority of existing studies have restricted attention to downward-flowing wealth transfers within the family, i.e., from parents to their progeny, with the purpose of establishing a link between the dynamics of lineage wealth, inequality, and economic development (e.g., Banerjee and Newman, 1993; Galor and Zeira, 1993; Zilcha, 2003; Galor and Moav, 2004). By comparison, the number of studies considering upward-flowing transfers, from adult children to their old parents, is rather limited. This neglect is not warranted though. Several authors have argued that the financial support that adults provide to their old parents is a salient feature of developing economies (e.g., Caldwell 1976; Clay and Vander Haar 1993; Lee *et al*. 1994; Logan and Bian 2003; Frankenberg and Kuhn 2004; Payne *et al*. 2019), while others have shown that the anticipation of such transfers can alter the recipients' decision making on aspects that are pertinent to economic growth and development (e.g., Laitner 1988; O'Connell and Zeldes 1993; Blackburn and Cipriani 2005).

The objective of this study is to contribute towards filling this void in the literature. It presents a growth model where the provision of income from adult children to their old parents, is driven by attitudes, norms and customs on the strength of family ties.[1] These are treated as cultural traits that evolve intergenerationally, through a process of cultural transmission. In line with empirical evidence, the model shows that economic development is negatively related with upward-flowing intergenerational transfers, and with the strength of family ties. The key factors of the model's

[1] Cultural differences on the strength of family ties have recently emerged as prominent explanatory factors of various aspects of economic activity. See Giuliano (2007), Alesina and Giuliano (2010, 2011, 2014), Alesina *et al.* (2015), Brumm and Brumm (2017), Ang and Fredriksson (2017), and Galasso and Profeta (2018) among others.

mechanisms are the impact of income transfers on parents' saving behaviour, the declining significance of these transfers for parents' overall income in the process of economic development, and the influence of these characteristics on the intensity of cultural instruction by parents with different attitudes on family ties. Furthermore, the study's results offer more general implications about the role of economic factors for the evolution and establishment of cultural traits among the population.

The aspect of cultural transmission is a significant point of departure of my framework, in comparison to existing theories of economic growth that incorporate intergenerational income transfers among family members. This approach is justified though, given the focus on upward-flowing intergenerational transfers and their underlying characteristics. Indeed, there is a plethora of evidence and arguments, offering credence to the view that a strong sense of family ties is a fillip to moral considerations of filial piety, which provide individuals with an incentive to offer financial support to their parents. Chang (2013) presents empirical evidence on a positive relation between family ties and intergenerational transfers from adult children to their old parents, whereas Coste-Font (2010) presents evidence that strong family ties generate expectations to individuals, regarding the potential support from their progeny, prompting them not to insure against the costs of their future long-term care.[2] To some extent, these observations echo Becker's (1992) argument that "*parents […] may try to instil in their children feelings of guilt, obligation, duty, and filial love that indirectly, but still very effectively, can "commit" children to helping them out.*"[3] These ideas become even more pertinent, once we consider evidence that the culture of strong family ties is more prevalent in developing countries (e.g., Alesina and Giuliano, 2010, 2014) i.e., those countries in which we observe significant transfers from adult children to their old parents.

The scatterplots in Figures 1-3 aim at providing additional empirical motivation in relation to the aforementioned ideas. Figure 1 illustrates the correlation between two

[2] It is worth mentioning that, in some cases, the support of adult children to their old parents is not of a material nature (e.g., Attias-Donfut *et al.*, 2005). Nevertheless, the foregone cost of marketed services of old-age care, and the opportunity cost of foregone labour income, still have a significant monetary value, which implies a transfer of resources from children to their parents.

[3] Similar arguments on customs and norms of filial obligation, and their role for upward-flowing income transfers and support, are discussed in Willis (1979), Komter and Vollebergh (2002), Kohli and Künemund (2003), and Lowenstein and Daatland (2006) among others.

variables from the 2008 wave of the European Values Study (EVS), for the 44 European countries in the data.[4] The first variable is the percentage of people who agreed with the statement that "*one does not have the duty to respect and love parents who have not earned it by their behaviour and attitudes*". This is a variable that researchers have employed as a measure of family ties – with lower values indicating stronger family ties (e.g., Alesina and Giuliano, 2010) – as it measures the unconditional love and respect that children attach to their relation with their parents. The second variable is the percentage of people who agreed with the statement that "*adult children have the duty to provide long-term care for their parents even at the expense of their own well-being*" – a measure of intergenerational support, from adults to their old parents. As we can see, there is a negative correlation between these two variables, indicative of a positive correlation between strong family ties and people's willingness to support their old parents. Figures 2 and 3 illustrate the correlation between each of these EVS variables with the level of real GDP per capita.[5] These plots indicate that income per capita is negatively correlated with people's sense of obligation in supporting their old parents, and with the strength of family ties.

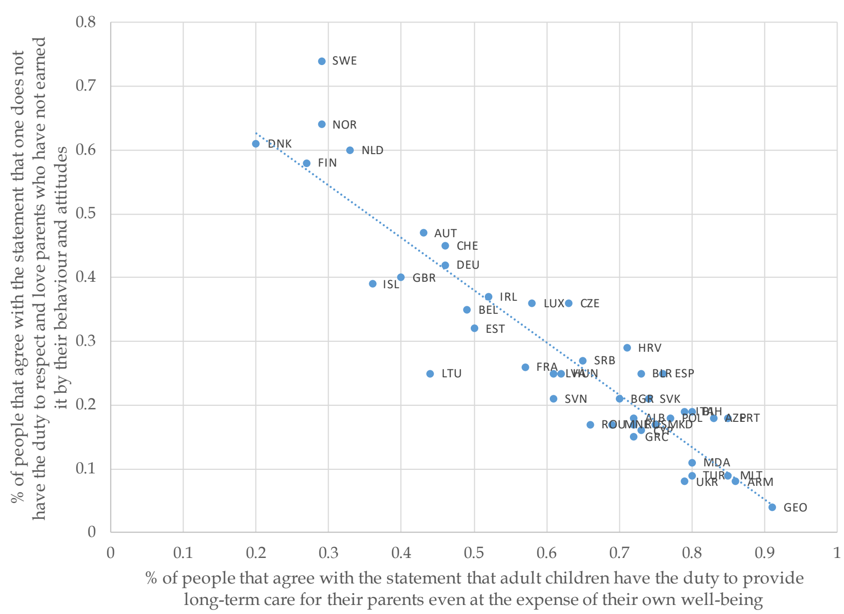

Figure 1

[4] Data were retrieved from http://www.atlasofeuropeanvalues.eu/.
[5] Data on 2008 real GDP per capita were retrieved from the World Bank (https://data.worldbank.org/).

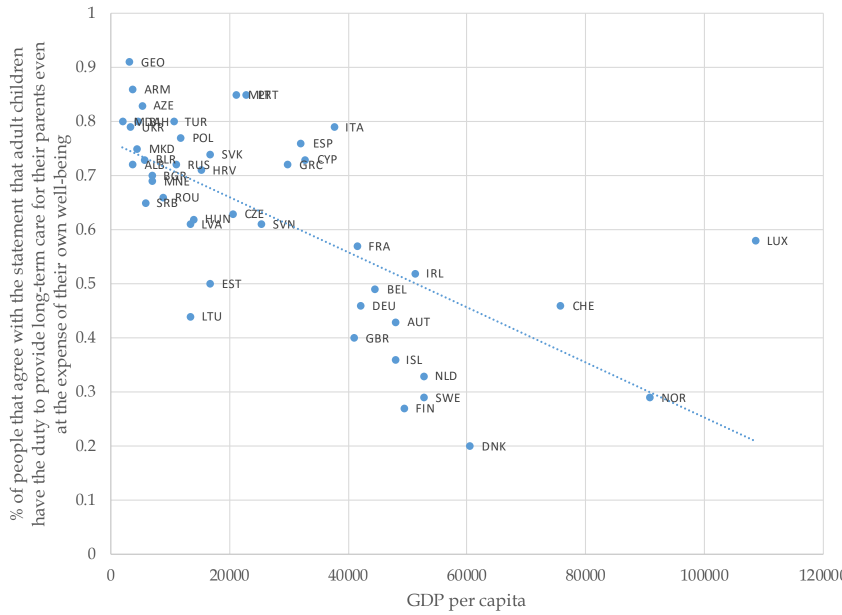

Figure 2

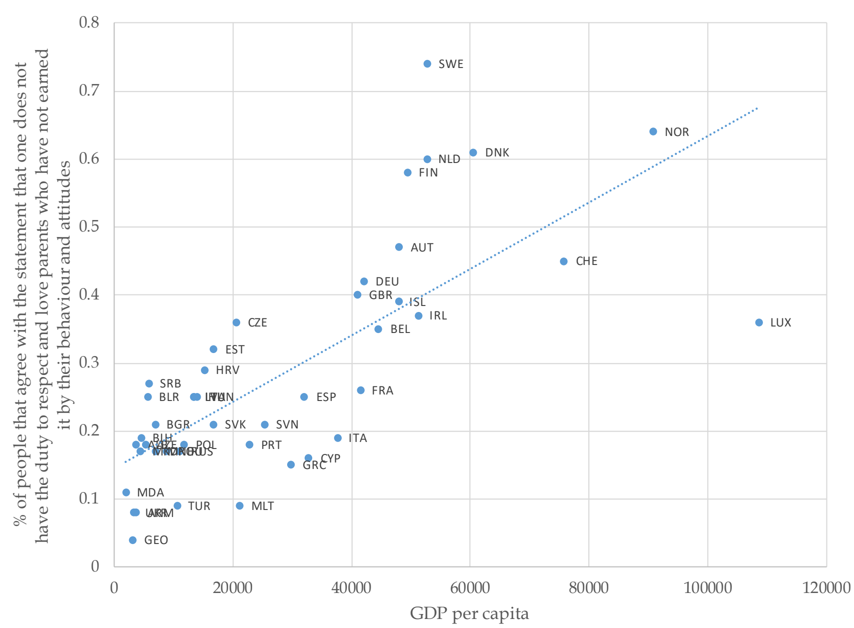

Figure 3

My model is consistent with the previously discussed ideas and evidence. There are two cultural traits determining agents' attitudes on family ties, and only those who are inculcated with a strong sense of family ties provide income transfers to their old parents. These transfers are given as 'gifts', i.e., they are not *quid pro quo*. Following the pioneering work of Bisin and Verdier (2001), I assume that the main underlying motive why parents actively undertake the cultural instruction of their children is because they use their own subjective viewpoint as the benchmark for evaluating their children's choices – ultimately, they want their children to uphold the same attitudes and values as they do.[6] Nevertheless, the link between the strength of family ties and the potential receipt of financial support from adult children, trigger additional parental considerations of a more 'selfish' nature: Given the prospect of receiving income from their children, parents who uphold a strong sense of family ties have an additional motive – and, therefore, intensify their efforts – to inculcate their offspring with the same attitudes, whereas parents whose sense of family ties is weak have a reduced incentive – and, therefore, abate their efforts – to instil their own attitudes in their offspring. As the economy grows, however, the importance of intergenerational income transfers for parents' overall income declines. Consequently, economic development is associated with less intense instruction towards a culture of strong family ties and, therefore, a gradual reduction in the population share of individuals who uphold such attitudes and values. These outcomes cause an overall reduction of upward-flowing income transfers in the process of economic development.

The impact of economic development on the population's adherence to strong family ties is not the only mechanism that links economic dynamics and cultural change. On the contrary, the causal effect runs in the opposite direction as well: A shift in the distribution of traits among the population, favouring a limited adherence to strong family ties, and the corresponding decline in the overall flow of income transfers from adult children to their old parents, are factors that promote capital accumulation and economic growth. The reason is that parents who anticipate the receipt of income from their children, hence increased consumption in maturity, reduce their saving when young in an effort to smooth their intertemporal consumption profile. This mechanism is

[6] Bisin and Verdier (2001) use the term 'imperfect empathy' to describe this type of parental preferences.

intuitive and consistent with the existing results on the relation between upward-flowing income transfers and saving behaviour – see, for example, Laitner (1988) and O'Connell and Zeldes (1993). It is also consistent with the evidence presented in Coste-Font (2010).

The two-way causal link between economic development and the cultural evolution of attitudes on family ties, can generate path-dependent equilibria, i.e., outcomes that are not only sensitive to structural parameters, but also to the economy's history. On the one hand, the economy may follow a convergence path towards a low level of economic development, where adherence to strong family ties is the dominant characteristic of a culturally homogeneous population, and where the overall flow of transfers from adult children to their old parents is substantial. On the other hand, the economy may follow a different path of convergence towards a relatively higher level economic development, where the population is more diverse in terms of their attitudes on family ties, and where the overall flow of transfers from adult children to their old parents is lower by comparison. Thus, the different long-term equilibria are consistent with the negative correlation between (i) economic development and upward-flowing income transfers within families, and (ii) economic development and the strength of family ties.

Although my study's ideas and objectives are broadly related to those in Galasso and Profeta (2018), there are important differences as well. Their focus is on filial obligations in an environment of different inheritance rules, and their implications for the establishment of different social security systems. They do not consider saving behaviour, and take the culture of filial obligations as given, whereas my model emphasises the role of upward-flowing intergenerational transfers for parents' saving behaviour, and the endogenous change in the culture of family ties through an explicit process of cultural transmission. These characteristics are, in fact, pertinent for the model's outcomes and implications. In contrast to Galasso and Profeta (2018), I abstract from downward-flowing intergenerational transfers (e.g., inheritance) and from the presence of social security systems. Nevertheless, one of the model's equilibrium mechanisms, i.e., the decline of the relative importance of private income transfers for parents' overall income in the process economic development, is a good approximation for what a well-established system of social security actually achieves in this context.

It is worth mentioning that the model's mechanisms and results have more general implications for the dynamics of cultural transmission – implications that go beyond the specific example of the nexus between economic development and intergenerational income transfers from the young to the old. To see this, note that in archetypal economic models of cultural transmission, like the one pioneered by Bisin and Verdier (2001), the population share of individuals who possess a specific cultural trait (i.e., in terms of preferences, attitudes, values, norms etc.) is a substitute to parents' own efforts to instruct their children towards the adoption of this trait. Under such circumstances, which Bisin and Verdier (2001) summarised through the term '*cultural substitution*', the dynamics of cultural transmission do not display path-dependence. Instead, the long-run outcome is a unique equilibrium of cultural diversity: This equilibrium depends on the model's structural parameters, but it is not sensitive to history (Bisin and Verdier, 2001, 2008). In my model, path-dependence and a long-run outcome of cultural homogeneity are possible, despite the presence of cultural substitution. The key feature is that the distribution of cultural traits is not the only state variable in the model. On the contrary, there is another, economic-related state variable (in this case, the stock of capital) whose relation with the distribution of cultural traits is two-way causal. If this underlying *cultural-economic complementarity* is strong enough, it can dominate the opposing forces of cultural substitution, thus triggering and sustaining the sequence of reinforcing effects between cultural and economic dynamics, and ultimately laying the foundations for path-dependence.

In this respect, my study evokes one of the underlying messages in Francois and Zabojnik (2010): Their model also raised awareness to the possibility that the complementary nature between economic development and cultural change can result in path-dependent outcomes.[7] However, the model of Francois and Zabojnik (2010) rules out cultural substitution, as it does not account for the cost borne by parents in their effort to instil their own trait in their offspring. My model shows that the complementarity between economic development and cultural change can strong

[7] For other studies on the relation between economic development and the evolution of cultural traits, see Doepke and Zilibotti (2008, 2015, 2017); Klasing (2014); Chakraborty *et al.* (2016); and Varvarigos (2020).

enough to offset the presence of cultural substitution in generating divergence through history-dependent outcomes.

The remainder of this study is structured as follows: Section 2 describes the characteristics of the model economy. In Section 3, I present the detailed analysis of cultural transmission, while in Section 4, I analyse the process of capital formation. Section 5 analyses the model's joint dynamics, and presents the main implications for economic development, the evolution of family ties, and upward-flowing intergenerational transfers. Section 6 discusses and concludes.

2 The Economy

Consider an infinite horizon economy in which time is discrete and indexed by $t = 0,1,2,...$. The economy is populated by overlapping generations of three-period-lived agents. For an agent born in period $t-1$, the three periods of her finite lifetime are categorised as childhood (in $t-1$), youth (in t) and maturity/old age (in $t+1$). When young, each agent gives birth to an offspring, meaning that the economy's population is constant over time. To simplify the exposition even further, I also assume that the constant population mass of each age cohort is normalised to one. [8]

There are two cultural traits, s and w, that determine agents' sentiments on family ties, which, in turn, determine their feelings of duty and obligation to support their old parents financially. Agents are inculcated with a specific trait in childhood, through a process of intergenerational cultural transmission – from parents and 'role models' to children. The trait that agents adopt in childhood affects their attitudes and decisions in adulthood. Type-s agents are those who conform to a strong sense of family ties, which materialises in their desire to support their mature parents through income transfers. Type-w agents are those whose sense of family ties is weak; hence, they do not feel any obligation to offer financial support to their mature parents.

[8] Some authors consider demographic change as a key element in the relation between the upward-flowing intergenerational transfers and economic development (e.g., Caldwell, 1976; Blackburn and Cipriani, 2005). Others, however, have questioned this approach (e.g., Lee, 2000). I abstract from issues of endogenous fertility choice, to keep the analysis and exposition tightly focused on endogenous cultural change.

Young adults have a unit of labour, which they supply to firms in exchange for the wage ω_t. They decide how much to consume ($c_{t,y}$), how much to save and invest (i_t), and – as long as they possess a strong sense of family ties – how much income ($\hat{\delta}_t$) to give to their parents. Given their own role as parents, young adults also devote effort in cultural instruction, in order to instil their desired trait in their offspring.

Once they reach maturity, agents do not have an endowment of labour time. Their consumption ($c_{t+1,o}$) is financed by their income from saving and investment ($((1+R_{t+1})i_t$, where R_{t+1} is the return to capital investment) and – as long as their children have adopted a strong sense of family ties – the financial support ($\overline{\delta}_{t+1}$) they receive from them.[9] It should be noted that, as will become clear later, children of Type-w parents may actually adopt the s trait. In this case, their parents will not refuse the 'gift' $\overline{\delta}_{t+1}$ from their children, despite the fact they, themselves, do not conform to attitudes and values that are consistent with strong family ties.

2.1 Consumption, Saving, and Intergenerational Transfers from Young Adults to their Old Parents

In terms of the timing of events, when agents reach adulthood and bear their offspring, they make all their economic decisions following their children's adoption of a specific trait, through the process of cultural transmission. In other words, parents know their children's type when they make decisions on consumption, saving and (depending on their own type) income transfers.

The utility from lifetime consumption of a Type-j young adult, whose offspring adopted the j' trait, where $j, j' = \{s, w\}$, is given by

$$u_t^{j,j'} = \ln(c_{t,y}^{j,j'} + I(j)M(\hat{\delta}_t^{j,j'})) + \beta \ln(c_{t+1,o}^{j,j'}), \tag{1}$$

where $\beta \in (0,1)$, $M'(\hat{\delta}_t^{j,j'}) > 0$, $M''(\hat{\delta}_t^{j,j'}) < 0$ and $I(j)$ is an indicator function, such that[10]

[9] To formalise the exposition, $\hat{\delta}$ is used to indicate income transfers offered by adult children to mature parents, while $\overline{\delta}$ is used to indicate income transfers received by mature parents from adult children.

[10] The quasi-linear formulation in the first period component of agents' utility serves the purpose of analytical tractability. This is because it will yield an equilibrium solution for income transfers that is time-

$$I(j)=\begin{cases}1 & \text{if} \quad j=s\\ 0 & \text{if} \quad j=w\end{cases}. \tag{2}$$

The objective of a young adult is to maximise (1) subject to

$$c_{t,y}^{j,j'}+\hat{\delta}_t^{j,j'}=\omega_t-i_t^{j,j'}, \tag{3}$$

$$c_{t+1,o}^{j,j'}=(1+R_{t+1})i_t^{j,j'}+\overline{\delta}_{t+1}^{j,j'}. \tag{4}$$

Let us consider young adults of Type-w. If their children are also of Type-w, then (1)-(4) clearly indicate that $\hat{\delta}_t^{w,w}=0$ and $\overline{\delta}_{t+1}^{w,w}=0$, meaning that their problem is to maximise

$$u_t^{w,w}=\ln(c_{t,y}^{w,w})+\beta\ln(c_{t+1,o}^{w,w}), \tag{5}$$

subject to

$$c_{t,y}^{w,w}=\omega_t-i_t^{w,w}, \tag{6}$$

$$c_{t+1,o}^{w,w}=(1+R_{t+1})i_t^{w,w}. \tag{7}$$

The problem can be solved by substituting (6)-(7) in (5), and maximising with respect to $i_t^{w,w}$. It leads to the optimal solution

$$i_t^{w,w,*}=\frac{\beta}{1+\beta}\omega_t, \tag{8}$$

which can be substituted back to the constraints in (6) and (7) to yield

$$c_{t,y}^{w,w,*}=\frac{1}{1+\beta}\omega_t, \tag{9}$$

$$c_{t+1,o}^{w,w,*}=(1+R_{t+1})\frac{\beta}{1+\beta}\omega_t. \tag{10}$$

If their children are of Type-s, however, they will have the desire to provide income to their old parents, i.e., $\overline{\delta}_{t+1}^{w,s}>0$. In this case, the problem of young Type-w adults is to maximise

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invariant, as it will be independent of ω_t. On the outset, this may appear to be a strong result. However, it should be emphasised that the model is not meant to investigate income distribution dynamics, therefore time-invariant income transfers have a minimal cost (if any) to what this study seeks to investigate. With this in mind, and given the upward-flowing nature of income transfers, having such transfers varying over time would imply that, in addition to the stock of capital and the distribution of cultural traits among the population, there would be a third state variable, whose dynamics would actually be forward-looking. A dynamical system like this would be impossible to solve analytically and, if anything, would undermine the clarity of the mechanisms and of the intuition. Finally, note that the assumption adopted in my model is not without precedent in the literature. The same assumption, resulting in time-invariant income transfers, is employed by Blackburn and Bose (2003) among others.

$$u_t^{w,s} = \ln(c_{t,y}^{w,s}) + \beta \ln(c_{t+1,o}^{w,s}), \tag{11}$$

subject to

$$c_{t,y}^{w,s} = \omega_t - i_t^{w,s}, \tag{12}$$

$$c_{t+1,o}^{w,s} = (1+R_{t+1}) i_t^{w,s} + \overline{\delta}_{t+1}^{w,s}. \tag{13}$$

The problem can be solved by substituting (12)-(13) in (11), and maximising with respect to $i_t^{w,s}$. The optimal solution in this case is

$$i_t^{w,s,*} = \frac{\beta}{1+\beta}\omega_t - \frac{\overline{\delta}_{t+1}^{w,s}}{(1+\beta)(1+R_{t+1})}. \tag{14}$$

Substituting (14) back to the constraints in (12) and (13) yields

$$c_{t,y}^{w,s,*} = \frac{1}{1+\beta}\left(\omega_t + \frac{\overline{\delta}_{t+1}^{w,s}}{1+R_{t+1}}\right), \tag{15}$$

$$c_{t+1,o}^{w,s,*} = (1+R_{t+1})\frac{\beta}{1+\beta}\left(\omega_t + \frac{\overline{\delta}_{t+1}^{w,s}}{1+R_{t+1}}\right). \tag{16}$$

Now, let us consider young agents of Type-s, and consider the general scenario where their children are of any Type-j', $j' = \{s, w\}$. Given (1)-(4), their problem is to maximise

$$u_t^{s,j'} = \ln(c_{t,y}^{s,j'} + M(\hat{\delta}_t^{s,j'})) + \beta \ln(c_{t+1,o}^{s,j'}), \tag{17}$$

subject to

$$c_{t,y}^{s,j'} + \hat{\delta}_t^{s,j'} = \omega_t - i_t^{s,j'}, \tag{18}$$

$$c_{t+1,o}^{s,j'} = (1+R_{t+1}) i_t^{s,j'} + \overline{\delta}_{t+1}^{s,j'}. \tag{19}$$

The underlying assumption is that agents initially decide how to allocate their resources intertemporally, i.e., they choose $i_t^{s,j',*}$, and subsequently decide how to allocate their net-of-saving income when young, i.e., $\omega_t - i_t^{s,j',*}$, between their own consumption and the income transfer to their parents. Solving by backward induction, this implies that we are first looking for solutions that maximise $c_{t,y}^{s,j'} + M(\hat{\delta}_t^{s,j'})$ subject to $c_{t,y}^{s,j'} + \hat{\delta}_t^{s,j'} = \omega_t - i_t^{s,j',*}$. Therefore, the optimal choice for $\hat{\delta}_t^{s,j',*}$ satisfies $M'(\hat{\delta}_t^{s,j',*}) = 1$, or

$$\hat{\delta}_t^{s,j',*} = M'^{(-1)}(1) \ \forall t. \tag{20}$$

Henceforth, I consider the specific function

$$M(\hat{\delta}_t^{s,j'}) = (m\hat{\delta}_t^{s,j'} - z)^{\mu}, \tag{21}$$

where $m, z > 0$ and $\mu \in (0,1)$. It follows that $M'(\hat{\delta}_t^{s,j',*}) = 1$ leads to the solution

$$\hat{\delta}_t^{s,j',*} = \frac{(\mu m)^{\frac{1}{1-\mu}} + z}{m}. \tag{22}$$

Now, let us normalise the term z by the composite

$$z \equiv (\mu m)^{\frac{1}{1-\mu}} \frac{1-\mu}{\mu}. \tag{23}$$

The normalisation in (23) implies an optimal solution

$$\hat{\delta}_t^{s,j',*} = (\mu m)^{\frac{\mu}{1-\mu}} \equiv \delta \ \forall t, \tag{24}$$

which means that parents of Type-s children will receive transfers according to

$$\overline{\delta}_{t+1}^{w,s} = \overline{\delta}_{t+1}^{s,s} \equiv \delta \ \forall t. \tag{25}$$

Furthermore, the expression in (24) implies that $M(\hat{\delta}_t^{s,j',*}) = \hat{\delta}_t^{s,j',*}$. In other words, $c_{t,y}^{s,j',*} + \hat{\delta}_t^{s,j',*} = c_{t,y}^{s,j',*} + M(\hat{\delta}_t^{s,j',*})$ which, together with (17)-(19), means that the optimal solution for $i_t^{s,j',*}$ is the one that maximises

$$u_t^{s,j'} = \ln(\omega_t - i_t^{s,j'}) + \beta \ln((1+R_{t+1}) i_t^{s,j'} + \overline{\delta}_{t+1}^{s,j'}). \tag{26}$$

If the offspring of a Type-s young adult is also of Type-s, then $\overline{\delta}_{t+1}^{s,s} > 0$ and the optimal saving/investment decision is

$$i_t^{s,s,*} = \frac{\beta}{1+\beta}\omega_t - \frac{\overline{\delta}_{t+1}^{s,s}}{(1+\beta)(1+R_{t+1})}, \tag{27}$$

whereas if the offspring of a Type-s young adult is of Type-w, then $\overline{\delta}_{t+1}^{s,w} = 0$ and optimal saving/investment is

$$i_t^{s,w,*} = \frac{\beta}{1+\beta}\omega_t. \tag{28}$$

The results of the analysis so far can be summarised as follows: If children adopt the s trait, then parents will receive income transfers and, irrespective of their own type,

$$i_t^{w,s,*} = i_t^{s,s,*} = \frac{\beta}{1+\beta}\omega_t - \frac{\delta}{(1+\beta)(1+R_{t+1})}, \tag{29}$$

and

$$u_t^{w,s,*} = u_t^{s,s,*} = \ln\left(\frac{1}{1+\beta}\right) + \beta\ln\left(\frac{\beta(1+R_{t+1})}{1+\beta}\right) + (1+\beta)\ln\left(\omega_t + \frac{\delta}{1+R_{t+1}}\right), \tag{30}$$

by virtue of (11), (14)-(16) and (25)-(27). Nevertheless, the parents of children who adopt the w trait will not receive income transfers in their maturity. Therefore, irrespective of their own type,

$$i_t^{w,w,*} = i_t^{s,w,*} = \frac{\beta}{1+\beta}\omega_t, \tag{31}$$

and

$$u_t^{w,w,*} = u_t^{s,w,*} = \ln\left(\frac{1}{1+\beta}\right) + \beta\ln\left(\frac{\beta(1+R_{t+1})}{1+\beta}\right) + (1+\beta)\ln(\omega_t). \tag{32}$$

by virtue of (5), (8)-(10), (26) and (28).

At this point, it should be clarified that the purpose of the normalisation in (23) is to neutralise the impact on young Type-s agents' saving that emanates from the provision of financial support to their parents. The only impact that income transfers have on young agents' saving decisions emanates from the anticipation of receiving financial support from their children, when old. Indeed, by virtue of (21), (23) and (24), young Type-s and Type-w agents save the same amount of income, contingent, of course, on whether they anticipate being the recipients of income from their own children. The only difference is that young Type-w agents consume all their net-of-saving income, whereas young Type-s agents use the same amount of net-of-saving income to finance both their consumption expenditures and their income transfers to their old parents.

This aforementioned approach is justified by the study's objective, which is to focus exclusively on the impact on saving decisions that stems from agents' anticipation of an additional source of income in their maturity, i.e., the income transfer that they will receive in the event that their children adopt the s trait.[11] With this in mind, the impact of this income transfer on saving behaviour is straightforward and intuitive: No matter what their own stance and attitudes on family ties are, parents whose children are inculcated with a strong sense of family ties anticipate to receive income from them

[11] If anything, allowing for the case where the providers of income transfers to their parents have lower net saving, would actually reinforce the model's results: This would be an additional channel through which strong family ties impede capital accumulation.

when old. This increases their anticipated level of consumption in maturity, thus inducing them to smooth their intertemporal consumption profile by increasing their consumption in youth – something they do at the expense of their saving.

2.2 Output Production

The economy's homogeneous good is produced by a mass of perfectly competitive firms, who combine capital (k_t) and labour (l_t), in order to produce output (y_t) under a constant returns technology

$$y_t = Bl_t + Ak_t^a (h_t l_t)^{1-a}, \tag{33}$$

where $B, A > 0$ and $a \in (0,1)$. I follow Frankel (1962) and Romer (1986) in assuming that the productivity component h_t is related to the average stock of capital per person ($\overline{k}_t$) according to

$$h_t = \overline{k}_t. \tag{34}$$

Given that the population of workers is normalised to 1, it follows that $k_t = \overline{k}_t$. Combining with (33)-(34), we can derive the wage and the return to capital as follows:[12]

$$\omega_t = B + (1-a)Ak_t, \tag{35}$$

$$1 + R_{t+1} = aA \equiv r \;\; \forall t. \tag{36}$$

3 The Evolution of Family Ties through Cultural Transmission

The purpose of this section is to analyse the process through which children adopt one of the cultural traits s or w. I follow Bisin and Verdier (2001) in assuming that children are inculcated with one of these traits through a process of cultural transmission. A Type-j parent who wants to instil her own trait in her child, can do so with probability $\gamma_t^j \in [0,1]$, as long as she devotes $\frac{\varphi(\gamma_t^j)^2}{2}$ ($\varphi > 0$) units of effort towards the cultural

[12] Note the underlying assumption of full depreciation of capital in production.

instruction and socialisation of her offspring. This is the direct (vertical) channel of cultural transmission.

If the parent's effort is not successful, i.e., with probability $1-\gamma_t^j$, her child may still adopt her parent's trait through the oblique transmission: Specifically, the child will pick an agent, out of the existing population of young adults, who will act as the 'role model' and instil her own trait in the child. Therefore, the probability that the child will adopt her parent's trait, through the oblique transmission, is equal to the share of the population of young adults who share the same cultural trait with the child's parent.

Denoting the share of the population of young adults who adhere to a strong sense of family ties (i.e., those of Type-s) by f_t, it follows the child of a Type-s parent will adopt the s trait with probability

$$q_t^s = \gamma_t^s + (1-\gamma_t^s) f_t, \tag{37}$$

whereas the probability that the child of a Type-w parent will adopt the w trait is

$$q_t^w = \gamma_t^w + (1-\gamma_t^w)(1-f_t). \tag{38}$$

The reason why young parents engage with the process of cultural instruction is because they use their own subjective beliefs to evaluate their children's choices. Consequently, they have the innate desire to instil their own preferences, norms, values and attitudes in their offspring. I capture this idea by assuming that parents face the loss function

$$-\zeta(\hat{\delta}_{t+1}^{j',*} - \hat{\delta}_{t+1}^{j,*})^2, \tag{39}$$

where $\zeta > 0$, $\hat{\delta}_{t+1}^{j',*}$ is the child's choice of income transfers, consistent with her assumed trait $j' = \{s, w\}$, and $\hat{\delta}_{t+1}^{j,*}$ is the parent's desired choice – the one she would have made in her offspring's place, give her own type $j = \{s, w\}$. Of course, given the preceding analysis and the result in (24), it is $\hat{\delta}_{t+1}^{s,*} = \delta$ and $\hat{\delta}_{t+1}^{w,*} = 0$. Consequently, (39) implies that

$$-\zeta(\hat{\delta}_{t+1}^{j',*} - \hat{\delta}_{t+1}^{j,*})^2 = \begin{cases} -\zeta\delta^2 & \text{if} \quad j' \neq j \\ 0 & \text{if} \quad j' = j \end{cases}. \tag{40}$$

Taking account of our analysis so far, we can write the overall utility of a Type-s parent as

$$V_t^s = q_t^s u_t^{s,s,*} + (1-q_t^s)(u_t^{s,w,*} - \zeta\delta^2) - \frac{\varphi(\gamma_t^s)^2}{2}, \tag{41}$$

while the corresponding overall utility of a Type- w parent is

$$V_t^w = q_t^w u_t^{w,w,*} + (1 - q_t^w)(u_t^{w,s,*} - \zeta\delta^2) - \frac{\varphi(\gamma_t^w)^2}{2}. \tag{42}$$

Parents will choose their effort towards the cultural instruction of their children so as to maximise (41), if they are of Type- s, or (42), if they are of Type- w. Using (30), (32), (35)-(37), these problems lead to the following optimal solutions:

$$\gamma_t^{s,*} = \frac{(1 - f_t)[\zeta\delta^2 + \psi(k_t)]}{\varphi}, \tag{43}$$

$$\gamma_t^{w,*} = \max\left\{0, \frac{f_t[\zeta\delta^2 - \psi(k_t)]}{\varphi}\right\}, \tag{44}$$

where

$$\psi(k_t) = (1 + \beta)\ln\left(1 + \frac{\delta}{r[B + (1 - a)Ak_t]}\right), \tag{45}$$

such that $\psi'(k_t) < 0$, $\psi(0) = (1 + \beta)\ln(1 + \delta(rB)^{-1})$ and $\psi(\infty) = 0$. I impose the restriction $\varphi \geq \zeta\delta^2 + \psi(0)$ to ensure that the solutions in (43)-(44), being probabilities, are below one in value. It is also important to note that, following Francois and Zabojnik (2010), it is assumed that parents are unable to inculcate their children with a trait that differs from their own. This clarification is important in light of the decisions made by Type- w parents, as we shall see shortly.

The solutions in (43) and (44) allow us to infer the following result:

Proposition 1. *Economic development is associated with less intense cultural instruction by parents who adhere to strong family ties, and more intense cultural instruction by parents whose adherence to family ties is weak.*

Proof. From (43)-(44), it is straightforward to establish that $\frac{\partial\gamma_t^{s,*}}{\partial k_t} = \frac{(1 - f_t)\psi'(k_t)}{\varphi} < 0$ and $\frac{\partial\gamma_t^{w,*}}{\partial k_t} = \frac{-f_t\psi'(k_t)}{\varphi} > 0$. □

One thing that we should bear in mind is that the possibility of receiving financial support is a benefit that parents of Type-s children will receive, irrespective of their own type. On the one hand, for parents who adhere to strong family ties, the potential benefit of being recipients of income transfers offers an additional incentive to devote effort in inculcating their children with similar attitudes and values. On the other hand, for parents whose adherence to family ties is weak, the prospect of receiving income transfers, when old, mitigates the overall benefit of instilling their own attitudes and values in their offspring, hence inducing them to reduce their effort towards their offspring's cultural instruction. Another thing to note, however, is that, as the economy grows, the relative importance of income transfers for parents' overall income declines. Combining all these characteristics, it becomes clear why economic development leads to the outcomes presented in Proposition 1.

Another implication from the outcomes of the preceding analysis is summarised below:

Proposition 2. *The two components of the interegenerational transmission of attitudes on family ties, i.e., parents' direct transmission and the oblique transmission, are cultural substitutes. In other words, a rise in the population share of agents who conform to the attitudes and values with which parents wish to inculcate their children, leads to a decline in the intensity of parental efforts towards the cultural instruction of their offspring.*

Proof. From (43)-(44), it is straightforward to establish that $\frac{\partial \gamma_t^{s,*}}{\partial f_t} \leq 0$ and $\frac{\partial \gamma_t^{w,*}}{\partial (1-f_t)} < 0$. □

Generally speaking, the result of Proposition 2 is a well-known outcome in models of intergenerational transmission of cultural traits. Bisin and Verdier (2001, 2008) argued that this sort of cultural substitution lies beneath the lack of path-dependence, and the convergence towards an equilibrium of cultural heterogeneity that is independent of the initial distribution of cultural traits in the population. Although this is true in an environment where the distribution of traits is the only state variable, this study will show that, in the presence of another state variable, whose relation with the distribution of different cultural traits is two-way causal, path-dependence and cultural homogeneity may still emerge, even under the forces of cultural substitution.

In terms of intuition, when the attitudes and values, which parents wish to instil in their children, become more widespread among the population, parents understand that, even if their own effort in instilling their desired trait in their children is not successful, there is a higher likelihood that their children will eventually adopt this trait through interactions and cultural instruction 'outside' the family, i.e., through role models etc. This induces parents to reduce their own efforts towards the cultural instruction of their offspring.

Now, define the composite parameter terms

$$v \equiv e^{\zeta\delta^2/(1+\beta)}, \tag{46}$$

where $e \simeq 2.71828$ is Napier's constant, and

$$\hat{k} \equiv \frac{\dfrac{\delta}{r(v-1)} - B}{(1-a)A}. \tag{47}$$

Another result that will prove important for this study's outcomes is the following:

Lemma 1. *As long as $\hat{k} > 0$, it defines a critical level of economic development, below which Type-w parents do not provide any effort to instil their preferred trait in their children – only Type-s parents do.*

Proof. From (43)-(44), it is $\gamma_t^{s,*} > 0\ \forall k_t$ and $\gamma_t^{w,*} > 0$ if $\psi(k_t) < \zeta\delta^2$. Taking account of (45)-(47), this condition corresponds to

$$\ln\left(1 + \frac{\delta}{r[B+(1-a)Ak_t]}\right) < \frac{\zeta\delta^2}{1+\beta} \Rightarrow$$

$$\frac{\delta}{r[B+(1-a)Ak_t]} < e^{\zeta\delta^2/(1+\beta)} - 1 \Rightarrow$$

$$k_t > \frac{\dfrac{\delta}{r(v-1)} - B}{(1-a)A} \equiv \hat{k},$$

hence, completing the proof. □

The intuition here somehow relates to the discussion that followed Proposition 1. Income transfers reinforce Type-s parents' already existing incentive to instil a strong sense of family ties in their children. Consequently, these parents will be involved with the cultural instruction of their children at any level of economic development – or, in other words, no matter how significant income transfers are in relation to their overall income. In contrast, however, income transfers actually weaken Type-w parents' underlying desire to inculcate their offspring with their own attitudes on family ties. In fact, such transfers are very significant for their overall income at levels of economic development below $\hat{k}$, so much so that their potential benefit exceeds the utility benefit that these parents will enjoy from instilling the w trait in their children. Under such circumstances, parents who possess a weak sense of family ties have no incentive whatsoever to engage with the cultural instruction and socialisation of their children.

The preceding analysis lays the foundation for our understanding of how the distribution of attitudes on family ties, among the population, varies over time. To see this, let us think of the population share of those who are of Type-s. According to the preceding analysis, this share evolves according to

$$f_{t+1} = q_t^s f_t + (1 - q_t^w)(1 - f_t),$$

in which we can substitute Eq. (37)-(38) and manipulate algebraically to get

$$f_{t+1} = f_t[1 + (1 - f_t)(\gamma_t^s - \gamma_t^w)]. \tag{48}$$

Substituting (43)-(44) in (48) and taking account of Lemma 1, if follows that we can express the evolution of the population share of Type-s agents according to

$$f_{t+1} \equiv F(k_t, f_t) = \begin{cases} f_t\left[1 + (1 - f_t)^2 \dfrac{\zeta\delta^2 + \psi(k_t)}{\varphi}\right] & \text{if} \quad k_t \le \hat{k} \\ f_t\left[1 + (1 - f_t)\dfrac{(1 - 2f_t)\zeta\delta^2 + \psi(k_t)}{\varphi}\right] & \text{if} \quad k_t > \hat{k} \end{cases}, \tag{49}$$

from which we can deduce the following:

Proposition 3. *Economic development reduces the adherence to strong family ties among the population.*

Proof. Given $\psi'(k_t) < 0$, it is straightforward to establish that $F_{k_t} < 0$ from (49). □

This result comes as no surprise, given what has been presented and discussed so far. The process of economic development prompts more (less) intense efforts by Type-w (Type-s) parents to instil their own trait in their offspring. Consequently, this outcome reduces the share of the next generation's population who are inculcated with – and who will conform to – attitudes, values and norms that are consistent with strong family ties.

We can also use the expression in (49) to derive the following:

Lemma 2. *There exists*

$$\bar{f}_t \equiv \frac{\zeta\delta^2 + \psi(k_t)}{2\zeta\delta^2} \in \left(\frac{1}{2}, 1\right), \tag{50}$$

such that

$$\Delta f_{t+1} \equiv f_{t+1} - f_t \begin{cases} \quad > 0 & \text{if} \quad k_t \leq \hat{k}_t \\ \begin{cases} > 0 & \text{if} \quad f_t < \bar{f}_t \\ < 0 & \text{if} \quad f_t > \bar{f}_t \end{cases} & \text{if} \quad k_t > \hat{k}_t \end{cases}.$$

Proof. These results can be easily established by combining Lemma 1; the expression in (49); and the restriction $\varphi \geq \zeta\delta^2 + \psi(0)$ □

The intuition for the results presented in Lemma 2 is as follows: First, at levels of economic development below the threshold $\hat{k}$, only Type-s parents actively engage with the effort to instil the same cultural trait in their offspring. Therefore, the number of agents adhering to strong family ties will be growing, because the number of children who grow with Type-w parents, but who adopt different attitudes and norms, exceeds the corresponding number of children who grow with Type-s parents, but who adopt the w trait. Second, at levels of economic development above $\hat{k}$, the forces of cultural transmission converge towards an interior solution, indicating diversity in terms of the population's attitudes on family ties. This is because of the underlying cultural substitution that we established in Proposition 2.

4 Capital Accumulation

The dynamics of economic growth and development are captured by the evolution of the economy's capital stock. As it is customary in this type of models, I assume that perfectly competitive financial intermediaries collect funds from young agents, and invest them in a technology that transforms these funds in units of next period's capital stock. Formally,

$$k_{t+1} = f_t[q_t^s i_t^{s,s,*} + (1-q_t^s) i_t^{s,w,*}] + (1-f_t)[q_t^w i_t^{w,w,*} + (1-q_t^w) i_t^{w,s,*}],$$

in which we can substitute (29), (31), (35), (36) and $f_{t+1} = q_t^s f_t + (1-q_t^w)(1-f_t)$ to derive

$$k_{t+1} = \frac{\beta}{1+\beta}[B + (1-a)Ak_t] - \frac{\delta}{r(1+\beta)} f_{t+1}, \tag{51}$$

or, following the substitution of (49) in (51),

$$k_{t+1} \equiv K(k_t, f_t), \tag{52}$$

where

$$K(k_t, f_t) = \begin{cases} \dfrac{\beta[B+(1-a)Ak_t]}{1+\beta} - \dfrac{\delta}{r(1+\beta)} f_t \left[1 + (1-f_t)^2 \dfrac{\zeta\delta^2 + \psi(k_t)}{\varphi}\right] & \text{if} \quad k_t \leq \hat{k} \\ \dfrac{\beta[B+(1-a)Ak_t]}{1+\beta} - \dfrac{\delta}{r(1+\beta)} f_t \left[1 + (1-f_t) \dfrac{(1-2f_t)\zeta\delta^2 + \psi(k_t)}{\varphi}\right] & \text{if} \quad k_t > \hat{k} \end{cases} \tag{53}$$

The expression in (51) leads to the result in

Proposition 4. *A more widespread adherence to strong family ties inhibits capital accumulation and economic development.*

Proof. Given (51), we have $\dfrac{\partial k_{t+1}}{\partial f_{t+1}} = -\dfrac{\delta}{r(1+\beta)} < 0$. □

The intuition for the outcome summarised in Proposition 4 is straightforward to understand, once we recall the result in (29). Suppose that a higher fraction of next generation's population uphold attitudes and values that favour strong family ties. Then, an increasing share of young agents will anticipate to receive financial support from their children when they reach maturity. This outcome will cause a decline of saving, investment and, therefore, capital accumulation and economic growth.

5 Upward-Flowing Transfers, Family Ties, and Economic Development

The purpose of this section is to present and analyse the joint dynamics of economic development and of the distribution of attitudes on family ties among the population. Formally, these are characterised by the expressions in (49) and (52)-(53).

One of the main objectives of the study is to direct attention to the possibility of path-dependence in the joint determination of economic outcomes and cultural attitudes. To facilitate the exposition of this analysis, I shall impose the following parameter restrictions:

$$\frac{\beta(1-a)A}{1+\beta} < 1, \tag{54}$$

$$r > 1,\ \beta r < 1, \tag{55}$$

$$B \in \left(\frac{\delta}{r\beta}, \frac{\delta}{r(v-1)}\right), \tag{56}$$

$$v \in \left(1, 1+\frac{\beta^2}{1+\beta}\right) \Leftrightarrow \zeta < \frac{(1+\beta)\ln\left(1+\frac{\beta^2}{1+\beta}\right)}{\delta^2}. \tag{57}$$

The condition in (54) ensures that the capital stock will eventually converge to a stationary value, rather than undergoing perpetual growth, while (55) secures a positive net return on saving, and pins down the minimum vale in (56), since $\delta < \delta / \beta r$. Given this, the minimum value in (56) ensures that both the wage and savings, net of income transfers, are strictly positive even at the minimum value of the capital stock. In the same condition, the maximum value on B guarantees that the threshold $\hat{k}$ (defined in Eq. 47) is strictly positive. Finally, the condition for the composite term v in (57) just complements (56) in that it is sufficient to ensure that the latter presents an ascending range of values for B, from the minimum to the maximum.

Now, define the composite terms

$$\overline{B} \equiv \frac{\delta}{r}\left\{\left[1-\frac{\beta(1-a)A}{1+\beta}\right]\frac{1}{v-1}+\frac{(1-a)A}{1+\beta}\right\}, \tag{58}$$

$$b \equiv \frac{2\beta\zeta\delta^2}{1+\beta}\left[\frac{1+\beta}{\beta(1-a)A}-1\right], \tag{59}$$

and the function

$$g(f_t)=\left[1-\frac{\beta(1-a)A}{1+\beta}\right]\frac{\frac{\delta}{r[x(f_t)-1]}-B}{(1-a)A}-\left[\frac{\beta}{1+\beta}B-\frac{\delta}{r(1+\beta)}f_t\right], \tag{60}$$

where

$$x(f_t)=e^{\zeta\delta^2(2f_t-1)/(1+\beta)}=v^{2f_t-1}. \tag{61}$$

Then the following applies:

Lemma 3. It is $\lim_{f_t\to(1/2)^+} g(f_t)=+\infty$ and, as long as $B<\overline{B}$, $g(1)>0$. Furthermore, as long as $\frac{2+b+\sqrt{b^2+4b}}{2}<v$ holds, there exists $\tilde{f}\in(1/2,1)$ such that

$$g'(f_t)\begin{cases}<0 & \text{if} \quad f_t<\tilde{f}\\ >0 & \text{if} \quad f_t>\tilde{f}\end{cases}.$$

Proof. See the Appendix. □

As a means of illustrating through a numerical example, consider the case where $\beta=0.55$, $A=4$, $a=0.3$, $\delta=1$, $\zeta=0.1$ and $B=1.53$. Note that these values are consistent with the conditions in (54)-(57). Furthermore, $B<\overline{B}\simeq 1.586$ (meaning that $g(1)>0$) and $\tilde{f}\simeq 0.675$ (see Eq. A2 the Appendix). An important outcome in this configuration is that it yields $g(\tilde{f})<0$ for $\tilde{f}\simeq 0.675$. This shows that the function $g(f_t)$ can admit negative values – an outcome that has important repercussions for the model's long-run equilibrium, as it becomes clear in the result that is presented below:

Lemma 4. *As long as* $B < \overline{B}$ *and* $g(\tilde{f}) < 0$ *hold, there are three pairs of steady state equilibria* (k^*, f^*), (k^{**}, f^{**}) *and* (k^{***}, f^{***}), *such that* $k^* < \hat{k} < k^{**} < k^{***}$ *and* $1/2 < f^{***} < f^{**} < f^* = 1$. *The pairs* (k^*, f^*) *and* (k^{***}, f^{***}) *are locally asymptotically stable, whereas the pair* (k^{**}, f^{**}) *is unstable.*

Proof. See the Appendix. □

The equilibrium is illustrated on the phase diagram of Figure 4. As we can see, there is a saddle path, illustrated through the dotted red line, that separates two attracting long-run equilibria. This outcome rests with the two-way causal relation between economic development and the evolution of attitudes on family ties among the population.

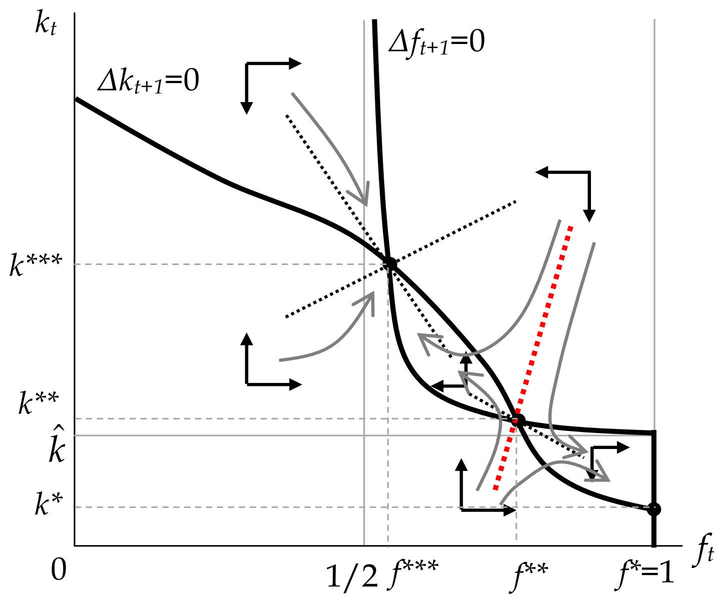

Figure 4. The phase diagram

For example, consider pairs (k_t, f_t) that lie to the right of the red dotted line that goes through (k^{**}, f^{**}), but below the horizontal line at $\hat{k}$. In these scenarios, although the forces of capital formation tend to increase the capital stock, the process of cultural transmission is conducive to the rise of the population share of those who uphold a strong sense of family ties. In fact, the rise in the share of Type-s agents is so pronounced that, at some point, the capital stock will start declining – a process that ensures that the capital stock remains below the threshold defined by $\hat{k}$. Income transfers remain significant enough to deter parents who do not adhere to strong family ties from instilling their own values in their offspring – only parents who abide by values conducive to strong family ties do so. Consequently, the share of Type-s agents will keep increasing, pushing down the capital stock even further below $\hat{k}$. Strong family ties will eventually dominate as the cultural characteristic of a population who will be homogeneous in this respect, since the long-run equilibrium entails $f^* = 1$. The corresponding level of economic development will be relatively low because of the suppressing impact of family ties, and therefore income transfers, on saving and capital accumulation.

Now, consider pairs (k_t, f_t) that lie to the left of the red dotted line of Figure 4, but still below the horizontal line at $\hat{k}$. In this case, the lower existing share of Type-s agents results in an increase of the capital stock that is pronounced enough to exceed the threshold defined by $\hat{k}$. When this occurs, Type-w parents have the incentive to actively pursue activities that aim at instilling their own trait in their children. This outcome supports the decline of the population share of those who abide by strong family ties, thus it is conducive to reduced income transfers. This outcome boosts capital formation, which, in turn, reduces (increases) the intensity of cultural instruction by parents who uphold a strong (weak) sense of family ties. In the long-run, the population will be culturally diverse with respect to their attitudes on family ties, as the long run equilibrium converges to $f^{***} < 1$. The corresponding level of economic development will be higher by comparison, as the presence of agents who do not conform to strong family ties is conducive to capital formation, due to the overall reduction in upward-flowing income transfers.

One implication from the preceding analysis is the following:

Proposition 5. *There is a negative long-run relation between economic development and (i) upward-flowing intergenerational transfers from adult children to their mature parents; (ii) the strength of family ties.*

Proof. It follows from the preceding analysis and the fact that the aggregate level of upward-flowing income transfers is $f_{t+1}\delta$. □

Another important outcome that emerges from the previous analysis is formally presented below:

Proposition 6. *The long-run equilibrium is path-dependent, as the joint determination of economic development and of the population's attitudes on family ties is sensitive to initial conditions. Although the oblique transmission and parents' direct transmission are cultural substitutes, path-dependence permeates the distribution of attitudes on the strength of family ties, in a manner that may eventually lead to cultural homogeneity towards strong family ties.*

Proof. It follows from Lemma 4 and the preceding analysis. □

Although generated from an economic model that is explicit on the economic and cultural characteristics under consideration (i.e., capital accumulation, intergenerational transfers, and family ties), the upshot from Proposition 6 can be, in fact, more general and with wider applicability. Indeed, the model shows that, despite the absence of any mechanism that eradicates the strength of cultural substitution between the direct and the oblique transmission channels, history-dependence, and the possibility of cultural homogeneity among the population, can still emerge as outcomes of the model's transitional dynamics and long-term equilibrium. The underlying cause is the presence of *cultural-economic complementarity*, i.e., a two-way causal interaction between the distribution of cultural characteristics (e.g., preferences; attitudes; values; norms etc.) among the population and another, economic-related, state variable. If this complementarity is strong enough, it can trigger and sustain the sequence of reinforcing effects between cultural and economic dynamics, which lay the foundations for path-dependent outcomes.

6 Discussion and Conclusions

The objective of this study was to provide a joint account of economic development, the culture of strong family ties, and the flow of intergenerational transfers from adult children to their old parents. A theoretical growth model with endogenous cultural transmission and upward-flowing income transfers, generated results that, in line with empirical evidence, showed that economic development is negatively related with upward-flowing transfers, and with the strength of family ties. The model identified a novel mechanism that has so far eluded the attention of researchers. Specifically, the evolution of cultural attitudes on family ties, i.e., a significant force behind upward-flowing income transfers, interacts with capital accumulation, in a manner that induces path-dependence. Key to the emergence of a path-dependent equilibrium, is the complementarity between economic development and the process of cultural change towards reduced conformity to strong family ties. In this respect, the study has wider implications for our understanding of cultural change, and of its interplay with economic progress. This is because, in contrast to what has hitherto been assumed, the model's results showed that a process of cultural transmission, which is subject to cultural substitution between the direct and oblique transmission channels, can still generate path-dependent outcomes, if it is also subject to strong cultural-economic complementarities.

The framework presented in this study incorporates several moving parts, as it combines fully-fledged dynamics for both capital accumulation and cultural transmission. Are all these parts, and the ensuing complication, necessary? For example, do we need an explicit account of cultural transmission? What is the added value in comparison to a model where there is a fixed distribution of attitudes on family ties among the population, which one could use for a comparative statics analysis on the model's steady state equilibrium? Let us start by addressing the last question. In other words, let us remove all aspects of endogenous cultural change from the model and, instead, assume that a fixed fraction $f \in (0,1)$ of the population adhere to strong family ties. In this case, the model's dynamics will be determined solely by capital formation. That is,

$$k_{t+1} = \frac{\beta}{1+\beta}[B + (1-a)Ak_t] - \frac{\delta}{r(1+\beta)} f ,$$

which generates a unique long-run equilibrium

$$k = \frac{\dfrac{\beta}{1+\beta}B - \dfrac{\delta}{r(1+\beta)} f}{1 - \dfrac{\beta(1-a)A}{1+\beta}} .$$

By virtue of $\partial k / \partial f < 0$, it follows that strong family ties lead to a lower level of economic development, because of the greater flow of intergenerational transfers. Nevertheless, this is only a part of the results and implications presented in this study. The scenario here is silent on the impact of economic development on the population's adherence to strong family ties, and on the implications for the flow of income transfers from adult children to their old parents. In fact, it is the presence of this channel that contributes to the major implications of this study: It is key to the emergence of history-dependent outcomes, thus indicating that differences in cultural characteristics can interact with economic outcomes, in a manner that establishes these differences as permanent fixtures of the development prospects among different economies. A process of endogenous cultural change is not a mere theoretical curio; it enriches our understanding of the issues at hand, to the extent that one could actually wonder about the possibilities, mechanisms and outcomes that remain unexplored in frameworks where cultural change is mute.

Taking account of the added complication from the fully fledged dynamics, the model was also deliberately stylised in order to be as tractable as possible, thus facilitating the clarity of its mechanisms and not blurring their intuition. Obviously, the model's objective was not to offer a complete account of all the factors that affect – and are affected by – the culture of family ties, or the flow of income transfers from adult children to their parents. Nevertheless, there is no reason to presume that abstracting from these factors necessarily undermines the accuracy and relevance of the model's results. For example, one could comment the absence of human capital from the model, arguing that parents, who anticipate transfers from their children, would have the incentive to invest in their offspring's education. However, this mechanism would imply that economic growth and development are positively related with upward-flowing transfers and with the strength of family ties – outcomes that contradict the existing evidence. Moreover, Blackburn and Cipriani (2005) have shown that the negative relation between upward-flowing transfers and economic development can emerge in a model of human capital-driven growth. Another issue involves one of the commonly used arguments for upward-flowing, private intergenerational transfers in developing countries, i.e., the lack of well-established systems of social security. Although this is a factor that is not explicitly modelled in this study, its impact is captured by one of the model's mechanisms, i.e., the reduced significance of private intergenerational transfers for parents' overall income in the process of economic development.

Generally speaking, this study is a step towards filling a gap in our existing understanding of the issues it investigates. Naturally, it can also be the platform for further research on these issues.

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Appendix

Proof of Lemma 3

$\lim_{f_t \to (1/2)^+} g(f_t) = +\infty$ is obvious from (60) and (61). By virtue of (61) $x(1) = v$, therefore $g(1) > 0$ as long as

$$\left[1-\frac{\beta(1-a)A}{1+\beta}\right]\frac{\frac{\delta}{r(v-1)}-B}{(1-a)A}-\left[\frac{\beta}{1+\beta}B-\frac{\delta}{r(1+\beta)}1\right]>0\Rightarrow$$

$$B<\frac{\delta}{r}\left\{\left[1-\frac{\beta(1-a)A}{1+\beta}\right]\frac{1}{v-1}+\frac{(1-a)A}{1+\beta}\right\}\equiv\overline{B},$$

where it should be noted that $\overline{B}$ lies within the range of values in (56) by virtue of the condition in (57). Now take the derivative $g'(f_t)$, which eventually yields

$$g'(f_t)=-\frac{\delta}{r(1+\beta)}\left[b\frac{x(f_t)}{[x(f_t)-1]^2}-1\right], \tag{A1}$$

where b is defined in (59). Combining (A1) and (61), we can infer that $g'(f_t)>0$ if

$$x(f_t)>\frac{2+b+\sqrt{b^2+4b}}{2}\Rightarrow$$

$$f_t>\frac{\frac{\ln\left(\frac{2+b+\sqrt{b^2+4b}}{2}\right)}{\ln(v)}+1}{2}\equiv\tilde{f}, \tag{A2}$$

where $\tilde{f}\in(1/2,1)$ for $\frac{2+b+\sqrt{b^2+4b}}{2}<v$. □

Proof of Lemma 4

Consider $k_t<\hat{k}$. By virtue of Lemma 2, $\Delta f_{t+1}>0\ \forall f_t$ meaning that the steady state value for f_t is the maximum value $f^*=1$. Substituting in (52)-(53), the corresponding steady state value for k^* is

$$k^*=\frac{\frac{\beta}{1+\beta}B-\frac{\delta}{r(1+\beta)}}{1-\frac{\beta(1-a)A}{1+\beta}}, \tag{A3}$$

which, for $B<\overline{B}$, and given (47) and Lemma 3, verifies that $k^*<\hat{k}$.

Now consider $k_t > \hat{k}$ and note that, by virtue of Lemma 2 and (50), any steady state solution for f_t will be greater than 1/2. To calculate the steady state, i.e., $\Delta f_{t+1} = 0$, we can use (50) and combine it with (45) and (61) to get

$$\psi(k_t) = \zeta\delta^2(2f_t - 1) \Rightarrow$$

$$k_t = \frac{\dfrac{\delta}{r[x(f_t)-1]} - B}{(1-a)A}. \tag{A4}$$

Next consider Eq. (51). Focusing at the steady state where $\Delta k_{t+1} = 0$ and $\Delta f_{t+1} = 0$, we can rewrite as

$$k_t = \frac{\dfrac{\beta}{1+\beta}B - \dfrac{\delta}{r(1+\beta)}f_t}{1 - \dfrac{\beta(1-a)A}{1+\beta}}. \tag{A5}$$

Substituting (A5) in (A4), and taking account of (60), it follows that

$$\frac{\dfrac{\beta}{1+\beta}B - \dfrac{\delta}{r(1+\beta)}f_t}{1 - \dfrac{\beta(1-a)A}{1+\beta}} = \frac{\dfrac{\delta}{r[x(f_t)-1]} - B}{(1-a)A} \Rightarrow$$

$$\left[1 - \frac{\beta(1-a)A}{1+\beta}\right]\frac{\dfrac{\delta}{r[x(f_t)-1]} - B}{(1-a)A} - \left[\frac{\beta}{1+\beta}B - \frac{\delta}{r(1+\beta)}f_t\right] = 0 \Rightarrow$$

$$g(f_t) = 0.$$

Therefore, taking account of Lemma 3, and as long as $g(\tilde{f}) < 0$, there are two solutions f^{**} and f^{***}, such that $1/2 < f^{***} < f^{**} < 1$, for which $g(f^{**}) = g(f^{***}) = 0$ and $g'(f^{***}) < 0$, $g'(f^{**}) > 0$. The corresponding steady state solutions for k_t can be obtained by substituting f^{**} and f^{***} in (A5). Given that $\dfrac{\partial k_t}{\partial f_t} < 0$ in (A5), it follows that $k^{***} > k^{**}$.

To examine stability, consider the Jacobian matrix of partial derivatives

$$\begin{bmatrix} K_{k_t} & K_{f_t} \\ K_{k_t} & F_{f_t} \end{bmatrix},$$

together with the characteristic equation

$$\lambda - \lambda T + D = 0. \tag{A6}$$

The roots of the characteristic equation are equation

$$\lambda_{(-)},\lambda_{(+)}=\frac{T\pm\sqrt{T^2-4D}}{2} \tag{A7}$$

where T and D are, respectively, the trace and the determinant of the Jacobian matrix, i.e.,

$$T=K_{k_t}+F_{f_t}, \tag{A8}$$

$$D=K_{k_t}F_{f_t}-K_{f_t}F_{k_t}. \tag{A9}$$

When $k_t<\hat{k}$, the equilibrium pair is (k^*,f^*) where $f^*=1$. Combining this together with (A8), (A9), (49) and (54), we get $T=1+\frac{\beta(1-a)A}{1+\beta}$ and $D=\frac{\beta(1-a)A}{1+\beta}$, meaning that the discriminant is equal to

$$T^2-4D=\left(1-\frac{\beta(1-a)A}{1+\beta}\right)^2.$$

Therefore, the roots of (A7) take values

$$\lambda_{(-)}=\frac{\beta(1-a)A}{1+\beta},\ \lambda_{(+)}=1,$$

meaning that the equilibrium pair (k^*,f^*) is stable because $\lambda_{(-)},\lambda_{(+)}\le 1$.

When $k_t<\hat{k}$, we established the existence of two equilibrium pairs (k^{**},f^{**}) and (k^{***},f^{***}). In general, under this scenario we have

$$K_{k_t}=\frac{\beta(1-a)A}{1+\beta}-\frac{\delta}{r(1+\beta)}F_{k_t}, \tag{A10}$$

$$K_{f_t}=-\frac{\delta}{r(1+\beta)}F_{f_t}, \tag{A11}$$

$$F_{k_t}=\frac{f(1-f)\psi'(k)}{\varphi}, \tag{A12}$$

$$F_{f_t}=1-\frac{f(1-f)2\zeta\delta^2}{\varphi}-(1-2f)\frac{(1-2f)\zeta\delta^2+\psi(k)}{\varphi}. \tag{A13}$$

Substituting Eq. (50), evaluated at the steady state, to the term $(1-2f)\zeta\delta^2+\psi(k)$ results in $\left[1-2\frac{\zeta\delta^2+\psi(k)}{2\zeta\delta^2}\right]\zeta\delta^2+\psi(k)=0$. Therefore, (A13) is rewritten as

$$F_{f_t} = 1 - \frac{f(1-f)2\zeta\delta^2}{\varphi}. \tag{A14}$$

Now, consider Eq. (45) and calculate its derivative

$$\psi'(k) = -\frac{(1+\beta)(1-a)A\delta}{r[B+(1-a)Ak]\{\delta + r[B+(1-a)Ak]\}}. \tag{A15}$$

Substituting (A4) and Eq. (59), we can rewrite the expression in (A15) as

$$\psi'(k) = -2\zeta\delta^2 \frac{r(1+\beta)}{\delta}\left[1 - \frac{\beta(1-a)A}{1+\beta}\right]\varepsilon(f), \tag{A16}$$

where

$$\varepsilon(f_t) = \frac{[x(f)-1]^2}{bx(f)}. \tag{A17}$$

To save on notation, define the composite terms

$$\Omega \equiv \frac{\beta(1-a)A}{1+\beta}, \tag{A18}$$

$$\Xi \equiv \frac{f(1-f)2\zeta\delta^2}{\varphi}, \tag{A19}$$

noting that $\Omega < 1$ by virtue of (54), and that $\Xi < 1$ by virtue of (50) and $\varphi \geq \zeta\delta^2 + \psi(0)$. Together with (A10), (A11), (A13), (A14) and (A16), it follows that the trace and the determinant can bet written as

$$T = \Omega + 1 - \Xi + \Xi(1-\Omega)\varepsilon(f), \tag{A20}$$

$$D = \Omega(1-\Xi), \tag{A21}$$

while the discriminant is

$$\begin{gathered}
T^2 - 4D = \\
[\Omega + 1 - \Xi + \Xi(1-\Omega)\varepsilon(f)]^2 - 4\Omega(1-\Xi) = \\
(\Omega + 1 - \Xi)^2 + [\Xi(1-\Omega)\varepsilon(f)]^2 + 2(\Omega + 1 - \Xi)\Xi(1-\Omega)\varepsilon(f) - 4\Omega(1-\Xi) = \\
[\Omega - (1-\Xi)]^2 + [\Xi(1-\Omega)\varepsilon(f)]^2 + 2(\Omega + 1 - \Xi)\Xi(1-\Omega)\varepsilon(f) = \\
[\Omega - (1-\Xi)]^2 + [\Xi(1-\Omega)\varepsilon(f)]^2 + 2(\Omega + 1 - \Xi)\Xi(1-\Omega)\varepsilon(f) \\
-4(1-\Xi)\Xi(1-\Omega)\varepsilon(f) + 4(1-\Xi)\Xi(1-\Omega)\varepsilon(f) = \\
[\Omega - (1-\Xi)]^2 + [\Xi(1-\Omega)\varepsilon(f)]^2 + 2[(\Omega - (1-\Xi)]\Xi(1-\Omega)\varepsilon(f) + 4(1-\Xi)\Xi(1-\Omega)\varepsilon(f) = \\
\{[\Omega - (1-\Xi)] + \Xi(1-\Omega)\varepsilon(f)\}^2 + 4(1-\Xi)\Xi(1-\Omega)\varepsilon(f).
\end{gathered}$$

Therefore, the roots of (A7) take values

$$\lambda_{(-)},\lambda_{(+)}=\frac{\Omega+1-\Xi+\Xi(1-\Omega)\varepsilon(f)\pm\sqrt{\{[\Omega-(1-\Xi)]+\Xi(1-\Omega)\varepsilon(f)\}^2+4(1-\Xi)\Xi(1-\Omega)\varepsilon(f)}}{2}.$$

Note that both $\lambda_{(-)}$ and $\lambda_{(+)}$ are positive numbers. Furthermore, $\lambda_{(-)},\lambda_{(+)}<1$ as long as $\varepsilon(f)<1$. Indeed,

$$\lambda_{(-)}<1\Rightarrow$$

$$\Omega+1-\Xi+\Xi(1-\Omega)\varepsilon(f)-2<\sqrt{\{[\Omega-(1-\Xi)]+\Xi(1-\Omega)\varepsilon(f)\}^2+4(1-\Xi)\Xi(1-\Omega)\varepsilon(f)},$$

which holds because $\Omega+1-\Xi+\Xi(1-\Omega)\varepsilon(f)<2$ for $\varepsilon(f)<1$, and

$$\lambda_{(+)}<1\Rightarrow$$

$$\sqrt{\{[\Omega-(1-\Xi)]+\Xi(1-\Omega)\varepsilon(f)\}^2+4(1-\Xi)\Xi(1-\Omega)\varepsilon(f)}<2-[\Omega+1-\Xi+\Xi(1-\Omega)\varepsilon(f)]\Rightarrow$$

$$\begin{aligned}&\{[\Omega-(1-\Xi)]+(\Xi(1-\Omega)\varepsilon(f))\}^2+4(1-\Xi)\Xi(1-\Omega)\varepsilon(f)<\\&4+[\Omega+1-\Xi+\Xi(1-\Omega)\varepsilon(f)]^2-4[\Omega+1-\Xi+\Xi(1-\Omega)\varepsilon(f)]\Rightarrow\end{aligned}$$

$$\begin{aligned}&[\Omega-(1-\Xi)]^2+[\Xi(1-\Omega)\varepsilon(f)]^2+2[\Omega-(1-\Xi)]\Xi(1-\Omega)\varepsilon(f)+4(1-\Xi)\Xi(1-\Omega)\varepsilon(f)<\\&4+(\Omega+1-\Xi)^2+[\Xi(1-\Omega)\varepsilon(f)]^2+2(\Omega+1-\Xi)\Xi(1-\Omega)\varepsilon(f)-4[\Omega+1-\Xi+\Xi(1-\Omega)\varepsilon(f)]\Rightarrow\end{aligned}$$

$$\begin{aligned}&[\Omega-(1-\Xi)]^2+\Xi(1-\Omega)\varepsilon(f)2(\Omega+1-\Xi)<\\&4+(\Omega+1-\Xi)^2+2(\Omega+1-\Xi)\Xi(1-\Omega)\varepsilon(f)-4[\Omega+1-\Xi+\Xi(1-\Omega)\varepsilon(f)]\Rightarrow\end{aligned}$$

$$4[\Omega+1-\Xi+\Xi(1-\Omega)\varepsilon(f)]<4+(\Omega+1-\Xi)^2-[\Omega-(1-\Xi)]^2\Rightarrow$$

$$4[\Omega+1-\Xi+\Xi(1-\Omega)\varepsilon(f)]<4[1+\Omega(1-\Xi)]\Rightarrow$$

$$\Xi(1-\Omega)\varepsilon(f)<\Xi(1-\Omega)\Rightarrow$$

$$\varepsilon(f)<1.$$

From (A1) and (A17), however, we know that $\varepsilon(f)<1\Rightarrow g(f)<0$. Given that $g'(f^{***})<0$, we conclude that the pair (k^{***},f^{***}) is a (locally) stable steady state equilibrium.

Now, let us consider $\varepsilon(f)>1$. If $\Omega+1-\Xi+\Xi(1-\Omega)\varepsilon(f)<2$ still applies, then $\lambda_{(-)}<1$ but $\lambda_{(+)}>1$ given what I have shown in the preceding analysis. The same analysis can be used to show that $\lambda_{(-)}<1$ and $\lambda_{(+)}>1$ also hold under $\Omega+1-\Xi+\Xi(1-\Omega)\varepsilon(f)>2$. Combining $\varepsilon(f)>1\Rightarrow g(f)>0$ and $g'(f^{**})>0$, it follows that the pair (k^{**},f^{**}) is an unstable steady state equilibrium (i.e., a saddle point). □