Materialism and Economic Progress

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ABSTRACT

Most empirical studies on the impact of materialism have focused on its effects at the micro-level, such as on individual wellbeing. This paper explores one of the macroeconomic impacts of materialism: its relationship with economic progress. A new conceptualization of materialism based on self-identity construction is offered and used to hypothesize that materialism drives economic progress by encouraging consumption and innovation. This analysis is tested using a survey item from the World Values Survey as an index for materialism. The empirical results, based on a short panel of data covering 74 nations and two periods, provide sufficient support to the conclusion that materialism can be a positive force for economic progress.

Keywords: Materialism; consumption; innovation; economic growth; economic progress; World Values Survey

JEL Classification Code: O11, O40, P36

1. Introduction

The term ‘materialism’ has been employed in diverse ways over many centuries. This paper is a contribution to a wide literature in the social sciences, psychology, economics, consumer studies and pop culture, in which materialism is taken to mean a system of values, beliefs, behaviour patterns or psychological traits based on, or heavily related to, consumption and possession. Research on this view of materialism has historically been dominated by scholars from psychology and marketing who were concerned about the impacts of a growing focus on the acquisition of material goods on individual wellbeing, society and the environment. As is evident from the title of Erich Fromm’s ([1976] 2013) influential book *To Have or To Be*?—a phrase reworked as ‘to have is to be’ by Helga Dittmar (1992, Dittmar and Pepper, 1994)—there was a sense that consumers were building their self-identities using their rising incomes and borrowing capacities to accumulate possessions and in the process might be losing sight of higher meaning in life. However, little attention was paid to the impact of materialism on economic developments.

The lack of empirical work on the macroeconomic consequences of materialism is surprising, given that, if people were less materialistic, they might save more of their discretionary income, thereby depressing aggregate demand and the inducement for firms to invest. Galbraith (1958) had long ago argued that, if corporate advertising had not been elevating materialistic tendencies, higher levels of deficit-financed government spending would have been needed to remove the deflationary gap that would otherwise have existed. Even if, like Katona (1960), one did not accept Galbraith’s perspective on the ability of the corporate sector to bolster aggregate demand, materialism might still have macroeconomic consequences via the impact it had on entrepreneurial behaviour and hence on the volume of investment and innovation. Materialistic societies might thus be expected to enjoy more economic progress and achieve higher levels of productivity compare to those who focused less on making money and were more concerned with, say, the spiritual side of life.

The present paper contributes to the literature on materialism and economic development in two novel ways. First, we used a modified version of Shrum et al.’s (2013) reconceptualization of materialism. The modification that we make overcomes some issues that arise in the process of trying to apply Shrum et al.’s approach in macroeconomic analysis, and our conceptualization has the potential for application in a wide range of future studies. It was with this new understanding of materialism were we be able to theorize the relationship between materialism to economic progress.

Secondly, the paper also provides a template on how the macroeconomic impact of materialism may be explored by using data that the World Values Survey began to collect in its Fifth Wave of research in 2005 and which seems especially potent in this context. Clearly, the macroeconomic effects of materialism may cumulate over decades and even centuries in terms of their impact on economic development, so the ideal case would be to investigate them on a cross-nation panel that covers more than a single decade. Yet it turns out that, even over the short period used in our analysis, materialism is indeed related to economic progress.

The rest of the paper is structured as follows. Section 2 reviews the existing literature on materialism and empirical studies on religiosity and economic growth. Section 3 first revisits the nature of materialism and then offers a new conceptualization of materialism which, in turn, is used to establish our hypotheses, setting out the case for expecting materialism to be a positive force for economic progress. Section 4 details our empirical strategy and our data sources. Section 5 presents our results. A detailed discussion of the results is presented in Section 6, while Section 7 offers a conclusion discussion.

2. The Existing Literature

Systematic empirical research on materialism began with Belk, a marketing scholar who saw the need to acquire, possess and collect as fundamental in human motivation (Belk, 1982a). He developed the Materialism Scale (MS) by using three personality traits—possessiveness, non-generosity and envy—to measure materialism (Belk, 1985) and employed it to show that materialism was associated with lower level of happiness. In a cross-cultural study of materialism, Ger and Belk (1990) used a modified MS and found that, contrary to conventional beliefs, Turkey was more materialistic than other developed nations. Dawson and Bamossy (1991) then discovered that a high degree of materialism was associated with lower level of life satisfaction, with 'envy' a significant predictor for all national samples, and Schroeder and Dugal (1995) found that materialism was positively associated with high level of social anxiety. However, despite these findings, researchers such as Hofmeister and Neulinger (2013) and Micken (1995) questioned the validity of MS in both cross-cultural and longitudinal studies. Shrum *et a*l. (2013) argued the many negative associations of materialism with wellbeing were endogenous, due to materialism being rated via 'dark' personality traits. This made it difficult to use Belk's MS to investigate possible non-detrimental consequences of materialism.

Richins (1986) proposed a different way of measuring materialism, using values instead of psychological traits. She argued that materialism should be defined as 'a set of centrally held beliefs on the importance of possession in one's life' (Richins and Dawson, 1992). These

values came under three main headings— 'centrality', 'happiness' and 'success'—each measured via a seven- or eight-item questionnaire. Together, they comprise the widely used Materialism Value Scale (MVS). Swinyard, Kau, and Phua (2001) used MVS in their study of materialism, religiosity and happiness among Singapore and US citizens, finding that adults in Singapore were more materialistic but less happy than their US peers. In both nations, however, materialism was negatively associated with happiness, whereas happiness was largely positive related to various measures of religiosity. This negative relationship between materialism and wellbeing was confirmed by more recent studies (Christopher, Saliba, and Deadmarsh, 2009; Elphinstone and Critchley, 2016; Muniz-Velazquez *et al*., 2017; and the meta-analysis by Dittmar *et al*. (2014). Studies have also shown that materialists tend:

- to be more insecure and therefore more likely to use possessions to boost their accomplishments and identity (Christopher *et al*., 2007),
- to have fewer self-identity dimensions and experience positive moods during shopping and negative moods after shopping (Noguti and Bokeyar, 2014),
- to be more extrinsically motivated, less able to adjust to global change and more prone to mental distress and behavioural disorders (Kasser and Ryan, 1993, 1996),
- to be more interested in new products and more responsive to marketing ploys (Goldberg *et al.*, 2003),
- to have a higher tendency to worship celebrities (Green *et al*., 2014),
- to be more emotionally involved with shopping and status products (Flynn *et al*., 2016; see also Richins, 2013),
- to view money as a source of power, a force of good and a token of achievement, yet budget their money poorly (Lemrova *et al*., 2014), and
- to be prone to lower levels of academic engagement and achievement (King and Datu, 2017).

These studies present the impact of materialism as overwhelmingly negative. However, there are reasons to doubt the validity and the significance of these conclusions. We have already noted the negative way in which Belk's MS measure is derived, but it is also important to recognize that materialists themselves differ in how they see the world: for example, Sirgy *et* al. (2013) found that, unlike materialists who employed an ideal-based (fantasy-based) way of evaluating their standard of living, materialists who did so using reality-based (ability-based) expectations tended to have higher economic motivation than less materialistic people, and this higher economic motivation was more likely to transfer into

higher life satisfaction. Moreover, very few studies of the impact of materialism have been conducted in developing nations and there are none on a global scale. The focus of the studies is on the consequences of materialism, almost all at the individual level; no research has previously been conducted on the long-term economic impact of materialism at the macro level as opposed to present levels of wellbeing.

An alternative measure of materialism, potentially useful for long-term analysis, is the Post-Materialism Index created by Inglehart and Abramson (1999), which has been included in the World Values Survey (WVS) as an indicator of social trends over the past three decades. This measure is based on Inglehart's (1981, 1990) view that people who focus on more basic needs such as economic security should be viewed as materialists, and those who focus on higher needs like self-expression and self-actualization should be viewed as post-materialists. However, the validity of this index has been questioned too: Davis and Davenport (1999) noted the lack of micro-level justification (compared with MS and MVS) and Ippel, Gelissen, and Moors (2014) indicated that the index performed inconsistently when applied in a cross-national study. Given this, the recent attempt of Shrum *et al*. (2013) to reconceptualise material warrants consideration. Like previous scholars, such as Belk (1982b) and Dittmar (1992), Shrum *et al*. view materialism as related to the self but they break new ground in trying to explain materialism by *beginning* with the concept of self.

Shrum *et al*.'s starting point (via Vignoles *et al*., 2006) is the idea that people are motivated to bolster their self-identity (including self-esteem, continuity, distinctiveness, belonging, efficacy and meaning). One way to do this is by accumulating money and acquiring material assets. Hence for Shrum *et al*. how materialistic a person is can be gauged by *the extent to which they engage in identity construction and maintenance through symbolic consumption*. On their view, acts of consumption should only be treated as materialistic if they serve a symbolic or signalling purpose. Materialistic consumption does not pertain merely to other-signalling (such as status-seeking conspicuous consumption) but also includes self-signalling (for example, when people seek wealth and material comfort but choose not to display it to others). Shrum *et al.*'s conceptualization of materialism is much broader and more inclusive that earlier attempts and is inherently neutral in terms of potential consequences. As such, it provides a promising starting point for scholars who seek to explore the macro consequence of materialism without prejudgement and that is why we have opted to use this as the foundation for the present study.

Materialism is often viewed as a phenomenon whose emergence goes hand in hand

with declining religiosity, as in a recent study of different immigrant groups by Zolfagharian and Ulusoy (2017) that found a negative relationship between materialism and religiosity. Insofar as religiosity has an impact on economic progress, it could be compounding or counteracting the macro-level impact of materialism. Given this, it is appropriate to include here a review of studies of the relationship between religiosity and economic performance. Like materialism, religiosity is a complex social phenomenon, but it can be defined broadly as the intensity of one's religious belief or the extent to which people allow religion to affect their personality (Hill and Hood, 1999). The concept has been quantitatively measured in a variety of ways. Some studies used religion-related questions from the WVS (Barro and McCleary, 2003; McCleary and Barro, 2006; Noland, 2005); others simply use the percentage of people with a religious affiliation (Noland, 2005; Wang and Lin, 2014). Variables on economic performance were usually GDP growth rate. For most studies, the coefficients were estimated with ordinary least square method, although the data sets were constructed in panels. Some studies (Noland, 2005; Wang and Lin, 2014) included many dummy variables to control for nation- and region-specific characteristics. Noland (2005) went so far as to conduct separate regression analysis for specific nations with unique features. As there are reasons to believe that religiosity could be endogenous, some studies applied the two-stage least squares approach, albeit with unsatisfactory instruments (Barro and McCleary, 2003; McCleary and Barro, 2006).

The results of these studies indicate that there is no general conclusion regarding religiosity and economic growth. Some studies concluded that a high intensity of religious activity slows economic growth (Campante and Yanagizawa-Drott 2015) while, on the other hand, the belief in God, heaven and hell seems to promote economic growth (Barro and McCleary, 2003; McCleary and Barro, 2006). However, this relationship is inconsistent over different denominations and different studies that used data for different time periods (Campante and Yanagizawa-Drott, 2015). For other measures of economic progress, many studies have showed an overwhelmingly negative relationship between religiosity and scientific progress, educational achievement and innovation. (Benabou, Ticchi, and Vindigni, 2015; Ecklund, and Scheitle, 2007; Sherkat, 2011). However, most of these studies used a standard cross-sectional dataset, thus forfeiting any nation-specific, cross-time variances in religiosity. Fixed effect estimation might have done a better job in controlling for unobserved nation-specific characteristics.

3. Theoretical Analysis

Although Shrum *et al*.'s (2013) view of materialism provided our starting point, we believe it needed to be modified to deal with two issues. The first is that Shrum *et al*,'s focus on the signalling and symbolic aspects of personal consumption could make their view of materialistic consumption problematic to operationalize in empirical work. In theory, there might exist goods that serve as means to ends other than bolstering self-identity, such as eating purely to survive, wearing cloths purely to keep warm or owning a car purely as 'a means of getting from A to B'. However, it is hard to think of actual forms of consumption that have no implications in terms of identity maintenance. For example, even if a car has not been chosen for its symbolic or signalling attributes and purely as a cost-effective means of transport, it may be used for getting to consumption venues or facilitating the purchase of goods and services that do bolster one's identity. Secondly, we need to take account of the possibility that a person's sense of self can be bolstered or enhanced not merely by the symbolic or signalling role of the things they consume but also by the accumulation of money and wealth itself, which allow them to gain status, fame, power and even popularity (through philanthropic donations).

Considering these two issues, we will drop the word 'symbolic consumption', while including the non-consumption aspect of materialism, and redefined it as the *extent to which people seek support and enhance their self-identity through material and monetary means.* The term 'monetary means' embodies the essence of the novel approach proposed here. It allows for self-identity to be bolstered by the thought of how much financial wealth one currently has (or has succeeded in accumulating), or by giving or accepting gifts and accumulating money to leave to others, or by receiving a monetary legacy (possibly after cultivating a relationship with the person making the bequest). It should also be noted that, unlike previous conceptualizations of materialism, the definition we propose excludes words such as 'possession': if the objective is to bolster one's self-identity, this can be realized by using one's resources in ways that do not necessarily involve holding on to them and may involve sharing them with others, as with philanthropy. In Table 1 we offer examples of how people can seek to support or enhance their self-identities by 'material and monetary means' to varying degrees. Table 1 is adapted from Shrum *et al*,'s own Table 1 to include examples consistent with our wider view of how people can use their financial resources to support or enhance their self-constructs.

Table 1. Identity motives and examples of low and high materialistic behaviours

Identity motive	**Interpretation**	**Examples of low-materialistic fulfilment**	**Examples of high-materialistic fulfilment**
Self-esteem	Maintaining and enhancing a positive self-concept	Dieting and exercising to improve body shape/appearance	Undergoing cosmetic surgery to improve one's appearance
Continuity	Maintaining the integrity of self across time and places	Cooking a favourite childhood dish	Donating money to help the development of one's hometown
Distinctiveness	Establishing and maintaining a self-identity that is different from others	Wearing a t-shirt that promote a specific cause	Buying a limited-edition sport car
Belonging	Fostering a feeling of closeness to acceptance by others	Supporting local sport team	Supporting local sport team by purchasing merchandize
Efficacy	Maintaining and enhancing a feeling of competence and controls over life	Mastering a new language	Trying to earn a higher income
Meaning	Fostering a feeling that one's life is significant and serves a purpose	Becoming a regular volunteer	Investing money in the next generation of technology

Note: This table is a modified version of '*Table 1*' in Shrum *et al*. (2013: the first two columns are exactly the same, but examples for each identity motive were modified to match the conceptualization of materialism in this study.

The self-identity conceptualization of materialism is closely related to the key components of Richins' materialism scales: how important people view possessions to be for their lives in terms of centrality, happiness and success. The construction of the self can be seen as a, or even the, major purpose of life, thus corresponding to centrality. The feeling of happiness can be seen as a cognitive reward for the effort we make in the construction and preservation of self. The 'success' scale is equivalent to saying one has done a very good job building up one's self-identity, through the channels listed in Table 1. However, Richins has focused on the 'appearance' of materialism and/or the kind of values that materialists have, whereas both Shrum et al.'s concept of materialism and our modification of it focus on what the purpose it serves.

Our view of materialism casts it as a substitute for religiosity. If we consider religion in relation to the self-identity motives listed in Table 1, it is evident that practicing a religion may provide an alternative route to achieving a sense of belonging, distinctiveness and meaning. The difference is that with materialism, the self is built upon the pursuit of consumer products and the worship of money, whereas in religion, the self is built upon adherence to religious principles and the worship some form of deity. Pursuit of materialism conflicts with following a religion, and vice versa, as is evident in (a) the negative attitudes taken by leaders of all major

religion towards materialism (Becker and Woessmann, 2013; Norris and Inglehart, 2011), (b) studies showing that religiosity is negatively associated with materialism (Stillman *et al*., 2012; Pace, 2013; Zolfagharian & Ulusoy, 2017), and (c) the fact that poverty, which is essentially the deprivation of material comfort, is often associated with higher level of religiosity (Keister, 2008). This clash between materialism and religiosity will be used in the empirical analysis that follows.

In forming hypotheses about the relationship between materialism and economic progress, we assume that people are (a) generally motivated to maintain and improve their self-identity and (b) can choose freely how to construct their self-identity through material and monetary means. With these assumptions, we can move on to analyse the relationship between materialism and economic progress at the macro level, first via the impact materialism has on the demand side of an economy, and secondly via its impact on innovation.

Hypothesis 1 (The Consumption Demand Channel): *When individuals in a society construct their self-identity through material and monetary means, it creates a continuous momentum for more consumption.*

Materialists validate their self-identity by owning, using and displaying consumer products. Materialists can boost their senses of self-esteem and efficacy simply through consumption, so whenever they are feeling depressed, sad or are enduring pain or misery, some 'retail therapy' that involves purchasing newer or fancier products can swiftly help repair the wounded self. This reasoning is consistent with studies that found a positive relationship between materialism and shopping intensity (Donnelly *et al*., 2016; Otero-López and Villardefrancos, 2012; Troisi, Christopher and Marek, 2006). This way of operating is not a recipe for equilibrium: the introduction of new products may limit the capacity of people to use their existing possessions to bolster their self-identity, leading them to feel negatively about themselves and hence to an urge to acquire those newer products. Thus, although economic progress may increase the range of products that people can afford, attempting to build a better self-identity by consuming more becomes akin to being on a treadmill: not having the new products is depressing, but obtaining them provides only temporary relief.

Hence, although a materialistic way of life may not ultimately improve individual wellbeing, it does help generate higher levels of aggregate demand than otherwise would have prevailed. This applies whether people are seeking to bolster their self-concepts by purchasing goods for themselves or by giving gifts. For materialism to *hamper* an economy's progress, higher levels of consumption must come at the expense of financial instability (where debt-financed expenditure proves unsustainable and borrowers end up defaulting) and/or via reduced

investment. In developing countries beset by foreign currency shortages, the ultimate constraint is an unwillingness to save: imports of luxury goods and/or the diversion of entrepreneurial activity away from production for exports could have a crowding out effect on investment (Joshi, 1970; Goldberg *et al*., 2003).

It is also possible that the bolstering of identity by 'monetary means' may hold down aggregate demand and discourage investment. For example, those whose strategy for bolstering their identities entail accumulating financial assets to give to others at a later date could instead be spending more on durable consumption goods, dining out, paying for domestic staff, or attending entertainment and cultural events. However, others who build their identities around getting rich may seek to do this by becoming entrepreneurs and ploughing their incomes back into their businesses. In the present paper, space constraints preclude any attempt to explore the significance of the cross-nation differences in the mix between the pursuits of identity by accumulating material assets versus by 'monetary means' of various kinds.

Hypothesis 2 (The Innovation Channel): *When individuals in a society construct their self-identity based on material and monetary means, it creates a demand for better and more sophisticated products, thereby giving momentum for continuous innovation.*

Profit opportunities will be available for entrepreneurs who can devise cost-effective ways for people to achieve boosts in self-identity. This may come via offering innovations that perform better than the technologies they supersede (as with electric lighting and automobiles) and confer status upon those who can afford to adopt them, or it may come indirectly by offering cheaper consumption solutions, thereby liberating funds to spend on bolstering one's self-identity. Insofar as entrepreneurs are successful in such endeavours, they, too, will be able to boost their self-identities via their own consumption and gift-giving actions, as will scientists who prosper due to making discoveries that entrepreneurs put to profitable use. (This is not to say the science and technology cannot make progress without materialism, merely that the presence of materialistic consumers fosters innovation and technological progress.)

This reasoning resonates with endogenous growth models that see long-run economic growth as driven by technological progress (Romer, 1986). In our theory of materialism-driven economic progress, materialistic consumers are only willing to pay more money (eventually, the increase in income for the whole economy) for more or for better products, both of which will give them a better sense of self. In the short run, the economy can still grow if consumers are allowed to buy more, but in the long term, as resources are limited, growth can only come from 'better', or more efficient use of these resources, which is essentially technological progress.

4. Empirical analysis and data sources

Measurement *of materialism*

To obtain a proxy for the extent of materialism on the national level, we turn to the World Values Survey (WVS), a cross-national research project led by an international team of scholars and funded by various international organizations and local partners. The project started in 1981 and provides data on roughly 250 measures of peoples' values and beliefs[4], including items that can be used to measure materialism (Bartolini and Sarracino, 2017) and religiosity (Barro and McCleary, 2003; McCleary amd Barro, 2006).

In this study, after a thorough examination of possible candidates, we decided to use one item (code name 'v71' in the Sixth Wave of WVS) to measure materialism as redefined in this paper. The item starts with a description: '*It is important to this person to be rich; to have a lot of money and expensive things*', and asks the respondent to choose if this person is: (i) *Very much like me*; (ii) *Like me*; (iii) *Somewhat like me*; (iv) *A little like me*; (v) *Not like me*; (vi) *Not at all like me*. WVS provides percentages (P_i) of respondents in a national sample who chose a specific option. This data is available for 52 nations in the Fifth Wave (2005-2009) and 60 nations in the Sixth Wave (2010-2014), with 31 nations having their data available in both waves[5]. In selecting *v71* as our proxy for materialism, we assume that the importance a person assigns to money and expensive objects reflects approximately how much his or her 'self' is constructed based on material and monetary means. It can be used as an index for our conceptualization of materialism because those who choose '*very much like me*' should be more materialistic than those who choose '*not at all like me*'. Similarly, a nation that has a higher percentage of people choosing the first four choices should also have a higher level of materialism.

Index of materialism

To facilitate empirical analysis, we construct an index of materialism for each country, which is a scalar measure in the range 0 to 100. The index is based on a relative valuation of responses to v71 in the World Values Survey where we assign 1 point for each response '*very much like me*', 0.75 point for '*like me*', 0.5 point for '*somewhat like me*' and 0.25 point for '*a little like me*', and 0 points for the last two options. This process is formalized in equation (1), with IOM_{v71} representing the index score of materialism for each country, P_i being the percentage of people choosing the first four 'materialistic' choices, and S_i being the aforementioned weights assigned to each percentage under the four 'materialistic' options.

$$IOM_{v71} = \sum_{i=1}^{4} S_i \cdot P_i\,, \qquad wit \quad 0 \le P_i \le 100 \tag{1}$$

The index has a maximum score of 100 percent if the respondents in a given country selected '*very much like me'* in item v71, and a minimum score of 0 if none of the respondent choose any of the four options. This choice of weighting may seem arbitrary. However, we have examined robustness of results using different sets of weight and the results remain largely consistency (see section 6 for more detail). The index was constructed for a total of 74 nations, more details of the variable is listed in Table A.1 in the Appendix, under variable IOMv71.

Indicators of economic progress

To test our first hypothesis, we use consumption per capita rather than GDP per capita to reflect the level of economic progress in our model. This choice was made because materialism can increase the level of income by boosting consumption, but its impact on investment and net export is less clear. The data were obtained from the World Bank and were measured with constant 2010 US dollar[6]. As item v71 is available for only two periods (2005–09 and 2010–14), the dataset for consumption are the mean values for each of the five-year period (see Table A.1).

To test hypothesis 2, we measure innovation with the Global Innovation Index (GII), compiled by Cornell University, the European Institute of Business Administration (INSEAD), and the World Intellectual Property Organization (WIPO). The index is comprehensive and is widely used in innovation-related studies (Filippetti *et al*., 2013).

As our primary objective is to examine the causal effect of materialism on innovation, and it is likely that any effect of materialism will present itself in a lagged form, as innovation takes time to realize, and the GII is computed partly from the output of innovation. Thus, it is better to relate the materialism score of one period with the innovation index of several years later. Here, the data on innovation of year 2012 was used to reflect the level of innovation in 2005-2009; and the data for 2017 represent the innovation level in 2010-2014. Besides innovation, GDP growth rate will be used as another dependent variable and a more direct indicator of economic progress. Table A.1 and A.2 present the detail information for these variables and their sources.

Econometric analysis

A panel dataset that consists of two five-year periods and 74 nations is constructed. The dataset is heavily unbalanced as there are missing values for all major variables (only 31 nations have

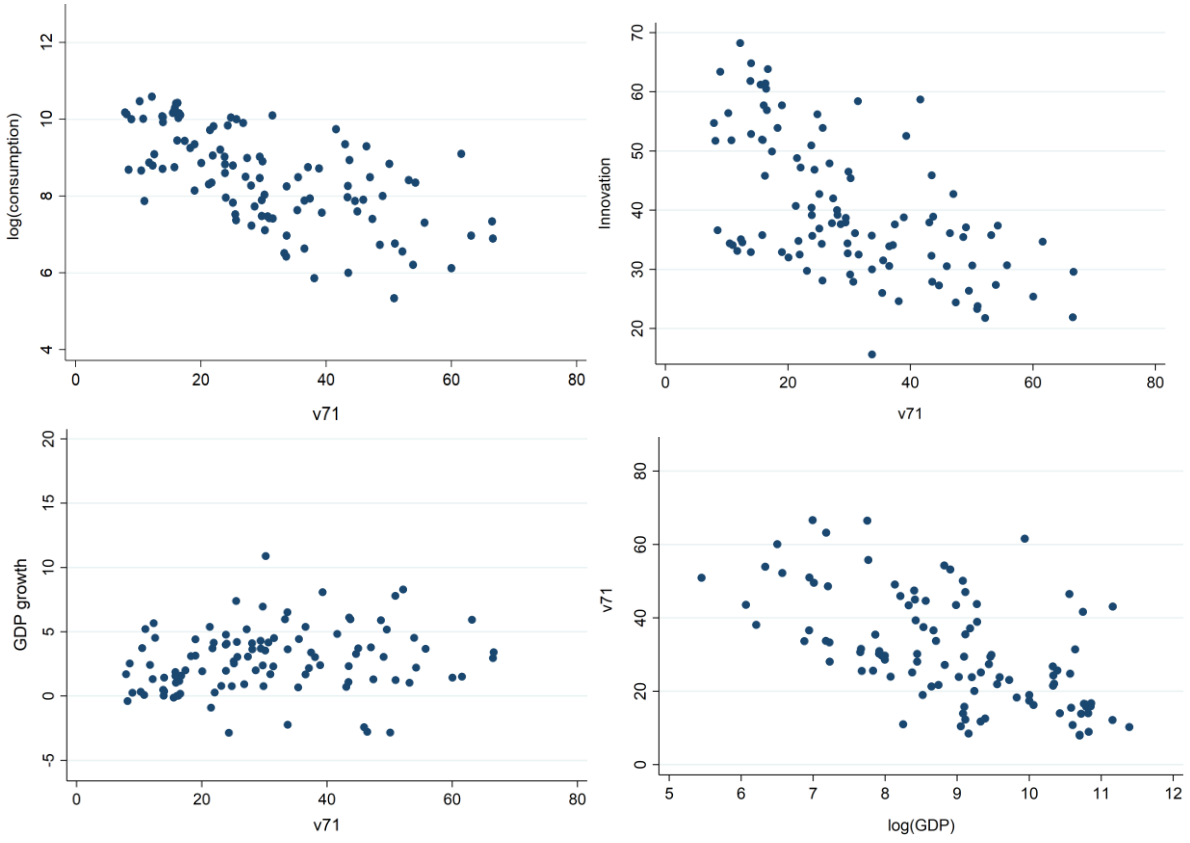
observations on v71 in both periods). Equation (2) is used to investigate the relationship between materialism and indicators of economic progress:

$$y_{it} = \alpha + \beta IOM_{v71} + \delta \boldsymbol{X} + v_{it} \quad (2)$$

In here, y can be household consumption per capita or national innovation score GII or the GDP growth rate; IOM $_{v71}$ is the index on materialism, and the column vector $\boldsymbol{X}$ includes control variables.

Figure 1 includes four scatter plots that allow for a visual examination of the relationship between materialism and indexes of economic progress.

Figure 1. Scatter plots for key dependent and independent variables.



Note: Upper left: logarithm of household consumption per capita against *v71* (IOM$_{v71}$) upper right: innovation index GII against *v71*; lower left: GDP growth rate against *v71*; lower right: *v71* against logarithm of initial level of GDP (in logarithm). It is clear from the scatter plot that there is a linear relationship between log(consumption), innovation, GDP growth and v71. We also observe a downward trend between materialism and income level from the lower right plot.

The negative association between materialism and economic progress in the scatter plots are expected as this confirms the post-materialism theory in Inglehart (1981, 1990), and because of the limitation of the question item *v71* in measuring materialism (which is discussed in detail section 6). But the graph only vaguely implies the negativity of the association, not necessarily the nature of causality.

Pooled estimator will first be used to show the general relationship between materialism and economic progress. Cluster standard errors will also be applied in consideration of heterogeneity problem.

Considering the panel nature of the data set, the fixed effect (FE) estimator, which controls for unobservable national characteristics and time-invariant factors such as cultural and social environment, will also be applied. Some of these factors can be difficult to measure, thus it might be better to use the fixed effect model. As the panel set is unbalanced, it is advisable to use the deviation-from-means approach to estimate the slope coefficient, as suggested in Adams, Matyas and Sevestre (2008). It is also worthwhile to compare the results from random effect (RE) estimator and that of pooled and FE model, but Hausman test will be performed to check the consistency of RE results

Besides IOM_{v71}, control variables are needed for possible causal interpretation and reducing the risk of IOM_{v71} being endogenous. In the household consumption model, such controls will include initial level of consumption (to control for the level of economic development), real interest rate and other macroeconomic variables like unemployment, GDP growth rate, saving rate and inflation that could affect consumer confidence. In the innovation and GDP growth model, control variables will include initial level of income, R&D spending, foreign direct investment (FDI), openness (measured as share of trade in GDP), export intensity, saving rate and education (Dosi, 1988). The inclusion of openness and export intensity are designed to account for some of the globalization effects (as materialism of one nation might drive the innovation and the growth of other nation via trade). Other seemingly unrelated variables like population size and urbanization are also believed to be related to innovation (Aarstad, Kvitastein, & Jakobsenm, 2016) and were added into the controls.

Data on these control variables are readily available on the global scale. A list of these variables, their description and data sources can be found in Table A.2 in the Appendix. All observations were entered as five-year average of each period except for initial consumption and income.

Endogeneity issue

Endogeneity can be an issue in our model for two reasons. First, the one-item index for materialism might be inaccurate, thereby introducing measurement error. Secondly, control variables may be insufficient and some unobserved effect in the error term might be correlated with our index of materialism. Here, the second problem will be addressed by using the

instrumental variable (IV) estimator, with two measures of religiosity as instruments for the possibly endogenous IOM_{v71}.

The reason for choosing religiosity as instrument is that we have strong evidence that religiosity is negatively associated with materialism and that it does not have a significant effect on economic growth (see the latter paragraphs of section 2). Moreover, religiosity can be measured rather easily and objectively, making it a suitable instrument for materialism. Although religiosity itself might also be endogenous as there could be a simultaneous relationship between religiosity and economic development (especially innovation), but with adequate control variables like initial level of income, we might be able to reduce the significance of this relationship.

To measure religiosity, we will again draw data from WVS questionnaire, which include many religiosity-related survey items. After a careful examination of these items, two of them came to our attention. One question (code name v152 in the Sixth Wave of WVS) ask the respondent about the importance of God in their life, on a scale of 1 to 10 (S_i), 1 being '*not at all important*' and 10 being *'very important*'. This item was chosen because religiosity, as represented by the importance of God and materialism, measured by the importance of money, are alternative systems of self-identity construction, and that they are substitute of each other. And this substituting nature is better manifested in these two items of similar style. Therefore, these two indexes should be strongly and negatively correlated.

For each national sample, WVS gives the percentage of respondents that chose a particular scale (P_i), thus the final national score, named *re1*, was computed in a similar way with that of IOM_{v71}, as represented in equation (3):

$$RE_1 = \frac{\sum_{i=1}^{10} S_i \cdot P_i}{10}, \qquad wit \; 0 \le P_i \le 100;\; RE_1 \in [0,100] \tag{3}$$

With this equation, we would have the highest score of 100 if respondents from the one nation all selected '*very important'* in v152.

Another item (code name v145 in the Sixth Wave) ask respondents how often they attend religious services, and by adding up the percentage of people who choose '*more than once a week*' and '*once a week*', the resulting data series (named RE_2) can be used as a complementary and more objective and unbiased measure of religiosity.

5. Empirical Results

Model with Per Capita Consumption as dependent variable

In this model, logarithm of per capita household consumption was used as dependent variables and IOM_{v71} as explanatory variable. The pooled, FE and RE estimators were applied to the dataset, and the results are presented in Table 2.

Table 2. Estimation results for Model 1

Dependent variable	Consumption					
Estimator	Pooled model		FE model		RE model	
IOM_{v71} (se)	-.0524449*** (.0064431)	-.0011505* (.0006475)	.0118319 (.0075124)	.002211** (.0010299)	-.0016931 (.0045799)	-.0009046* (.0005439)
Control variable	NO	YES	NO	YES	NO	YES
Observations (Nations)	105	94	105 (72)	94 (65)	105 (72)	94 (65)
F-statistics	-	8538.87	-	423.00	-	42915.51

Notes: Logarithm of per capital household consumption was used as dependent variable; control variables include initial level of consumption, real interest rate, unemployment, GDP growth, saving rate and inflation, the adding of which resulted in a mild reduction in sample size, as we did not manage to collect all data for all nations[8]. Pooled, FE and RE estimators were used to obtain the coefficient estimates for IOM_{v71}. The fifth row lists the number of observations and number of nations (in the parenthesis). The last row reports the F-statistics for the joint test of significance for control variables. ***Significant at 1% level; **Significant at 5% level; *Significant at 10% level. Results obtained with Stata 14.

Overall, a significant relationship was shown between IOM_{v71} and household consumption, but the sign and the level of significance vary across different estimators. While pooled and RE estimators yielded negative coefficients, the FE estimator is positive, and the coefficient is significant at 5% level when control variables are included. The F-statistics for these controls indicate their joint significance in the model.

Hausman test was performed to check the consistency of the RE estimation. For coefficient of IOM_{v71}, the t-statistic was 2.24, which leads to the rejection of consistency of the RE estimator at 5% level of significance. Therefore, fixed effects estimator, which indicates a positive relationship between materialism and consumption, provides a consistent estimate of the effect of IOM_{v71}.

Models with Innovation and GDP growth as dependent variables

In these models, GII innovation scores and GDP growth rates were used as dependent variables, and the results are shown in Table 3. We also conducted estimation for a subsample that

consists of only upper-middle and high-income nations (initial GDP per capita larger than $5000). This extra estimation was made due to data quality considerations, as we believe that data are of better quality for middle and higher income nations. Secondly, the role of innovation play a more significant role in the economic development of middle and higher income nations, and the same is also true for the relationship between materialism and economic progress (see section 3).

Table 3. Estimation results with innovation and GDP growth as dependent variables

Dependent variable	Innovation				GDP growth			
Sample size	Whole	Whole	Subsample	Whole	Whole	Whole	Subsample	Whole
Estimator	Pooled	FE	FE	RE	Pooled	FE	FE	RE
IOM_{v71} (se)	-.0199061 (.0291174)	-.0227236 (.0485078)	.2334119* (.1202509)	-.0744922*** (.0284553)	-.0232281 (.0166586)	.0647462* (.0356976)	.2594929** (.1045485)	-.0237559 (.0175579)
Observations (Groups)	92	92 (63)	66 (44)	92 (63)	95	95 (65)	66 (44)	95 (65)
F-statistics (p-value)	86.55 (0.0000)	3.35 (0.0021)	12.89 (0.0000)	573.33 (0.0000)	10.88 (0.0000)	2.64 (0.0116)	13.71 (0.0000)	81.70 (0.0000)

Notes: Here innovation index GII and GDP growth rate was used as dependent variable; control variables include initial level of income, R&D spending, foreign direct investment, openness, export intensity, education, population size and urbanization. Pooled, FE and RE estimators were used to obtain the coefficient estimates for IOM_{v71}. The whole sample includes all observations, while the subsample includes only nations that has an initial income level that is higher than $5000 (upper-middle and higher income economies). The subsample results for pooled and RE model were are shown, as they were similar with the whole sample estimation. The fourth row lists the number of observations and number of national groups (in the parenthesis). The last row reports the F-statistics and p-values for the joint test of significance for control variables. ***Significant at 1% level; **Significant at 5% level; *Significant at 10% level. Results obtained with Stata 14.

As is shown in Table 3 estimated coefficients in the pooled and RE models with IOM_{v71} were negative but insignificant, and the same with the consumption model. However, three of the four FE estimations gave positive and significant coefficients for IOM_{v71}. Results from the Hausman test indicate that FE model is to be preferred to RE model in all cases except for innovation model estimated with the whole sample. The positive relationship is especially significant in the GDP growth model, where both whole and subsample yield positive and significant coefficients (the results were also consistent if we include for example, innovation index and saving rate as additional controls). This means that for nations who reach a certain level of development, with everything else being equal, a higher level of materialism is associated with a higher level of innovation and economic growth, and the relationship could be causal.

Results from instrumental variables (IV) estimator

Because of the possibility that IOM_{v71} being endogenous, instrument variables (*RE1* and *RE2*) were used in all three models that have consumption, innovation and GDP growth as dependent variables, and the results are presented listed in Table 4. Due to the inconsistency of RE estimators, only FE estimates are presented.

Table 4. Instrumental Variable Estimation Results

Dependent variable		Consumption		Innovation		GDP growth	
Estimator		FE	FE	FE	FE	FE	FE
IOM_{v71} (se)		.0022515 (.0013767)	-.0037582* (.0022736)	-.4970911 (.3271911)	.3483656 (.3118492)	-.1572821 (.1877791)	.3342263** (.1516081)
Observations (Groups)		90 (63)	61 (41)	87 (60)	64 (42)	90 (62)	64 (42)
Sample size		Whole	Subsample	Whole	Subsample	Whole	Subsample
Hausman test (p-value)		0.795	0.238	0.024	0.706	0.066	0.504
First-stage	**F-sta.**	10.37 (0.0001)	4.20 (0.0221)	2.69 (0.0761)	2.37 (0.1062)	2.69 (0.0761)	2.37 (0.1062)
	Sign	Both negative	Both positive	Neg. for re1; pos. for re2	Both positive	Neg. for re1; pos. for re2	Both positive

Notes: Here log of household consumption per capital, score of GII and GDP growth rate (constant 2010 US$) were used as dependent variables; control variables were the same with that of previous estimations. Two instruments, *re1* and *re2* measure the importance of God and the intensity of religious activity. The fourth row lists the number of observations and number of national groups (in the parenthesis). The whole sample includes all observations, while the subsample includes only nations that has an initial income level that was higher than $5000 (upper-middle and higher income economies). The last three rows present the p-value for Hausman test, F-statistics for the test of instrument strength and the sign for *re1* and *re2* in the first-stage estimation. ***Significant at 1% level; **Significant at 5% level; *Significant at 10% level. Results obtained with Stata 14.

The F-value computed in first stage of the two-stage least squares procedure indicate that strong instruments only occurred in the whole sample consumption model (using a rule-of-thumb critical value of 10). The two instruments were only weakly, sometimes even insignificantly associated with IOM_{v71}. The Hausman test (Hill, Griffiths, & Lim, 2011) for endogeneity largely concludes that IOMv71 is exogenous, except for whole sample innovation and GDP growth model, but in which case the instruments' association with IOM_{v71} were also insignificant. As we might expect from the weak instruments and Hausman tests results, the IV estimates of coefficient of IOM $_{v71}$ are largely similar to those listed in Table 3 and standard FE coefficient estimates. Combining results from Table 3 and 4, we can conclude that materialism, as measured by IOM_{v71} and with adequate controls, could have a positive impact economic progress.

6. Discussion

On measuring materialism

The item v71 was chosen because it is closely related to our definition of materialism. In Bartolini and Sarracino (2017), 13 survey items (v71 included) from WVS were used to measure materialism. Many of these 13 items appeared to have rather tenuous connections with materialism - such as the question that asked the respondent about the importance of individual development - or relied on assumptions on the relationship between materialism and other variables. For example, if it is assumed that materialistic people place a less emphasize on interpersonal relationships, then it allows for index that measure the 'importance of friends and family in life' to reflect the level of materialism.

The reliability of such assumptions largely came from results from other studies on materialism (see section 2), many of which had a different conceptualization compared to the one used in this study. One can indeed argue that investing more time on friends and family could be an alternative means for the self-identity construction as opposed to materialism, but the exact exhaustiveness of these choices might be questionable, as one can simply express his or her love of their families by providing them more material comfort. In conclusion, there are reasons to question the validity of these seemingly unrelated items as measurements of materialism.

Potential biases in v71

Here, we first consider whether our results are sensitive to different computation methods used for IOM_{v71}. Thus, besides the linear weightings used for the four 'levels of materialism', we also tried five alternative weightings that follow an exponential function, which allocate different set of weightings to each of the four options as compared to original linear ones. The results from these new indexes are largely consistent with those presented in the last section, with only minor differences in standard errors.

The next potential bias of $IOMv_{71}$ is via the survey itself. First, the accuracy of v71 depends on the level of self-awareness and truthfulness of the respondents. For the item to be a true reflection of the level of materialism, the respondents must have an accurate and unbiased judgement of themselves, but there are reasons to suspect the opposite. As materialistic person tends to have vulnerable and lower self-esteem, which might make them less inclined to admit that their true self-identities. Many materialists are extrinsically motived, but in a survey, they might divulge their intrinsic values instead of the one that motivate their daily lives.

Even if the above bias is limited, there is still potential bias in using v71 for cross-national comparisons. The question asks about the importance of money, but for people of different economic background, the meaning of money can be very different. In developing nations, money is more important as it is more often used to satisfy the necessities of life. But in rich nations with adequate social welfare, the function of money is more likely to being materialistic. This is one reason why the score of v71 is generally much higher in developing nations than developed nations (see Table A.1 in Appendix). It may also explain why, according to v71 scores, some less commercialized societies (like Iran or Iraq) were significantly more 'materialistic' than some consumer societies (like US). Similar biases could also come from the meaning of 'expensive things' in different nations.

The cross-nation bias in v71 could also come from the complex nature of materialism itself, and again the bias is due to different levels of economic development. In developing nations, the question will pick up the aspiration aspect of materialism, while in developed nations it might fail to pick up the existing level of materialism. As in low-income nations, people are aspired to achieve higher income, while people in high-income nations can shift their focus on to less-material things (Inglehart, 1990). But it would be wrong to say that the living conditions in rich nations were not considered extravagant and materialistic by people of less developed nations, even though the former might not have realized it when they were answering the survey question. The above analysis of the bias potentially entailed in using v71 can help us explain some of the seemingly conflicting results from the empirical analysis.

Conflicting results across different estimators

As was shown in Figure 1, consumption and GDP were negatively associated with the measure of materialism IOM_{v71}. However, as it was explained above, the score on v71 depends heavily on the stage of economic development. As this bias is most apparent in cross-national comparisons, a negative relationship is more likely to manifest in the pooled and RE model which makes use of between-variation, and less likely to appear in the FE model, which uses only variation within the same nation. But with adequate controls for the level of economic development (like the initial level of income), we have been able to eliminate some of these negative relationships.

The above explanation was confirmed by the empirical results. In almost all the estimated models, the pooled and RE estimations largely yielded negative coefficients for IOM_{v71}, while most FE estimations gave positive ones. The negative relationship between the

pooled and RE model reveals that, without adequate controls, the general relationship between materialism and consumption or GDP per capita is negative. The scatter plot in Figure 1 also supports this conclusion. However, in the consumption model, after the inclusion of control variables, there was a reduction in absolute values and significance of the coefficient estimates in pooled and RE estimations, while the estimate from FE remain positive and became more significant. Thus, the FE estimator, where nation-specific characteristics were mostly controlled, is least susceptible for the biasness in v71. The result from Hausman test also confirm that the FE estimation is more consistent than RE, and the FE results also agree with our theoretical analysis on the relationship between materialism and economic progress.

However, the interpretation of FE estimation still require caution. The main reason is the relatively small within variance (in case of IOM_{v71}, the within variation was roughly 10% of between variance, see Table A.1 in Appendix), due to a small number of periods and an unbalanced dataset. As the deviation from mean method in FE uses only within variation, the result might be less robust and convincing compared to a more balanced data set, or if there were more periods of data available. We note here that the data set used in this study is the best available at this point of time.

The robustness of instrumental variable (IV) estimator

To reach a similar level of global scale and coverage, it is clear that potential instruments for our IOM_{v71} should also be drawn from the same source. Among the many items in WVS, those that measure religiosity are most likely related to materialism and at the same time having the least impact on our macroeconomic variables. In the process of selecting the best instruments, we have regressed IOM_{v71} against five religion-themed items with only initial income as controls, and the optimal candidates are *RE1* and *RE2*. From the results in Table 4, it can be seen that these two were weak instruments for IOM_{v71}. However, they performed rather well in the whole sample consumption model. Thus, the weak instruments cases in the innovation and GDP growth model could be the result of a different set of controls variables, the inclusion of which may have reduced correlation between IOM_{v71} and the error term (if there was any) and rendered IOM_{v71} exogenous.

Future research

There remain many opportunities for future research. First, there is a need for a more comprehensive theory construction regarding the matter of materialism and economic development. It is also important to relate and integrate materialism to other economic growth

models. In this study, we examined the macroeconomic impact of materialism, but its relationship with institutional factors like economic and social freedom, political liberalism and rule of law (all of which are essential in cultivating a materialistic society and are also believed to promote economic growth) are also worth exploring, especially under the new conceptualization of self-identity construct. Even within the scope of this study, more data from WVS in the coming years will improve the accuracy and robustness of the fixed effect model, provides an even more convincing result.

7. Conclusion

Shrum *et al*. (2013) made a valuable contribution, they re-conceptualized materialism in terms of the extent of spending of products that help people to enhance or maintain their identity. But it is not just spending on goods or self-enhancing services that enables people to feel good about themselves. Piling up money and other financial assets can give a sense of achievement or (if the money came as a gift or legacy) a sense of being valued by others. It is also a means for getting into a position where one can get satisfaction or esteem from being able to enhance the positions of others via gifts and philanthropic activities. In this paper we have therefore sought to refocus thinking about materialism on the desire to accumulate financial resources as well as on the acquisition of non-monetary assets. Taking this view of materialism opens the way to making international comparisons of materialism via survey data that, in essence, records the importance that people place on getting richer.

We explored the relationship between materialism and economic progress from the standpoint of this new, broader view of materialism, and theorized several channels through which materialism can encourage consumption and innovation. In the process, we used the self-identity approach to define materialism, and found a suitable measure in the World Values Survey. The paper also provides statistical evidence, within the limits of the currently available cross-national data, to suggest that materialism promotes consumption, innovation and economic growth. The relationship is especially strong in terms of the positive effect of materialism on GDP growth. From our statistical evidence, we draw a tentative conclusion that materialism has a positive impact on economic progress.

With results from this study, researchers should now have more information regarding the nature and significance of materialism and be motivated to assess its impact not just on the individual level, but also considering long-run economic development and progress. These results also shed some insight on the role of religiosity on economic growth. If religiosity is a

competing system of self-identity construct to materialism, then a stronger presence of religiosity just means less room for materialism to take hold. Since materialism can be helpful for economic growth, then by hampering the development of a materialistic society, religion might have an indirect negative impact on economic development even if it does not have a negative impact by more direct means.

On the other hand, acknowledging the positive effect of materialism at the macro level does not mean we should ignore the harms that a materialistic society can cause, not just to the wellbeing of its people, but also the environment. But these harmful effects are not inevitable, and it should not be forgotten that it is the richer societies that are best placed to raise the life expectancy of their citizens, reduce stress associated with long work hours and income uncertainty, and clean up their environments. A materialist's self-identity can be constructed through more, or better material satisfaction. The desire for newer, fancier and more innovative products (or 'greener') could encourages innovation and solves these problems without returning to austerity.

This paper is the first empirical study to explore the positive influence of materialism on economic development. It will help us explain why, despite its many negative impacts on wellbeing, happiness and mental health, materialism is still prevalent even in the most advanced economies. It is true that materialism produces greed, low self-esteem, stress, anxiety and deprives a person of true happiness, but it also drives an individual and the society to work relentlessly, and never being able to be satisfied with the status quo, thereby ensuring continuous economic progress.

NOTES

1. It is worth mentioning that these identity motives are not in themselves exhaustive, nor do people, in their construction of self, specially seek to satisfy a particular motive. The separation is just for the convenience of research.

2. It should be pointed out that not all philanthropic activities are materialistic. For example, one donates small amount of money to local charities out of empathy should not be counted as being materialistic.

3. This is also why some East Asian nations like South Korea, Japan and China, who took active measures in promoting export and limiting import had achieved rapid growth. While some nations that promote flexible exchange rate and free trade, like Bangladesh and India have fallen behind their East Asian peers in achieving an export led economic growth.

4. Subjects of survey are drawn from the entire population of 18 years and older. The minimum sample size is 1000 for most nations, and no upper age limit was imposed on age. Random sampling was used to obtain representative national samples. More information WVS please visit: http://www.worldvaluessurvey.org/WVSContents.jsp.

5. The data on v71 was collected from: http://www.worldvaluessurvey.org/WVSDocumentationWV6.jsp, on September 9th, 2017.

6. The data on household consumption was collected from: https://data.worldbank.org/indicator/NY.GDP.MKTP.KD, on September 5th, 2017. Other statistics like consumption as percentage of GDP can also be found in this website. All measures of income and consumption are based on standard exchange rate, not purchasing power parity (PPP) for data available concern.

7. The data on innovation was collected from: https://www.globalinnovationindex.org/userfiles/file/reportpdf/gii-full-report-2015-v6.pdf, on October 11th, 2017.

8. Wherever World Bank data was not sufficing, data from IMF or national statistics departments was used. In terms of GDP, saving rate and trade, missing data was filled with closest-to-date data when other more reliable sources of data were not available.

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APPENDIX

Table A.1 Descriptive statistics

	IOM*v71*			**Consumption**			**Innovation**		
Country	2005-209	2010-14	Ranking	2005-09	2010-14	Ranking	2005-09	2010-14	Ranking
Algeria		47.4	Nigeria	1364	1635	Switzerland		24.4	Switzerland
Azerbaijan		36.6	Ghana	2327	2650	Norway	30.4	30.6	Sweden
Argentina	10.5	20.1	Bahrain	5819	7033	United States	34.4	32	Netherlands
Australia	15.8	15.9	Mali	27964	29485	Australia	51.9	51.8	Singapore
Bahrain		61.6	South Africa	7103	9002	UK	41.1	34.7	UK
Armenia		24	Zimbabwe	2357	2855	Canada	34.5	35.7	Finland
Brazil	8.5	11.7	Pakistan	5902	7165	Japan	36.6	33.1	United States
Bulgaria	21.3		Ethiopia	4044		Sweden	40.7	42.8	Germany
Belarus		33.7	Lebanon	2613	3843	Finland	32.9	30	Hong Kong
Canada	16.6		Zambia	25815		Germany	56.9	53.7	South Korea
Chile	25.1	29.4	Rwanda	6592	8333	Netherlands	42.7	38.7	Canada
China	30.2	39.3	Jordan	1227	1933	France	45.4	52.5	Norway
Colombia		21.7	Algeria	3627	4228	Hong Kong	35.5	34.8	Japan
Cyprus	26.8	24.3	Kuwait	20084	18832	New Zealand	47.9	46.8	Estonia
Ecuador		30.2	Malaysia	2741	3091	Cyprus	28.5	29.1	France
Estonia		23.8	Iraq	8587	8319	Spain	55.3	50.9	New Zealand

Ethiopia	50.9		Iran	208.6	358.1	Singapore	23.3	24.2	Australia
Finland	13.9		Tunisia	23892		Slovenia	61.8	58.5	China
France	10.8		Qatar	22390		Qatar	51.8	54.2	Spain
Georgia	25.5	29.7	Morocco	1846	2686	South Korea	34.3	34.4	Slovenia
Germany	24.8	31.4	Singapore	23031	24266	Kuwait	56.2	58.4	Cyprus
Ghana	66.6	63.2	India	983.6	1066	Trinidad &To	29.6		Malaysia
Hong Kong		25.7	Turkey	18110	22061	Estonia	58.7	53.9	Hungary
Hungary	29.9		Burkina Faso	7366		Bahrain	46.5	41.7	Bulgaria
Indonesia	25.6		Azerbaijan	1584		Uruguay	28.1	30.1	Qatar
India	33.7	48.6	Vietnam	616	837.8	Chile	35.7	35.5	Poland
Iran	44.7		Kazakhstan	2625		Poland	27.3	32.9	Chile
Iraq		45	China		2001	Hungary			Romania
Japan	8.15	7.9	Russia	25277	26224	Turkey	51.7	54.7	Russia
Kazakhstan		35.5	Belarus	3498	4867	Lebanon	31.9	31.5	Moldova
Jordan	49.1	45.9	Yemen	2990	2702	Brazil	37.1	30.5	Bahrain
South Korea	18.3	19	Uzbekistan	10427	11488	Argentina	53.9	57.7	Serbia
Kuwait		46.5	Egypt		10890	Mexico	37.2	36.1	Thailand
Lebanon		50.1	Philippines	6457	6909	Russia	36.2	30.6	Ukraine
Malaysia	43.5	47	Thailand	3886	4863	Romania	45.9	42.7	Kuwait
Mali	60		Ecuador	453.9		South Africa	25.4	22.5	South Africa
Mexico	13.9	15.8	Hungary	6078	6311	Malaysia	32.9	35.8	Turkey
Moldova	28.1		Ukraine	1375		Kazakhstan	39.2	36.8	Vietnam
Morocco	55.8	29.8	Germany	1497	1767	Bulgaria	30.7	32.7	India
Netherlands	16.4	8.93	Moldova	22911	22141	Colombia	60.5	63.4	Colombia
New Zealand		14	Serbia	19166	20448	Serbia	53.1	52.9	Armenia
Nigeria		66.5	Georgia	1545	1541	Belarus	24.6	21.9	Brazil
Norway	10.3		Chile	35303		Peru	56.4	53.1	Uruguay
Pakistan		51	Hong Kong	830.9	865.5	Ecuador	23.1	23.8	Tunisia
Peru	11	19	Indonesia	2624	3442	Jordan	34.1	32.9	Georgia
Philippines		31.5	Poland	1450	1656	Thailand	29	32.5	Mexico
Poland	23.9	27.4	Cyprus	6841	8037	Iran	40.4	42	Jordan
Qatar		43.1	Romania	11534	11473	Armenia	45.5	37.9	Peru

Romania	27.2	23.9	Armenia	4936	5450	Tunisia	37.8	39.2	Lebanon
Russia	29.4	38.9	Estonia	4780	6145	Azerbaijan	37.9	38.8	Argentina
Rwanda	43.6	53.9	Trinidad & To.	402.9	498.2	Georgia	27.9	27.4	Morocco
Vietnam	36.6		Spain	758.6		Iraq	33.9	38.3	Kazakhstan
Singapore		41.6	Colombia	16509	17089	Ukraine	63.5	58.7	Belarus
Slovenia	17.4	16.3	Bulgaria	12559	12733	Egypt	49.9	45.8	Trinidad &To
South Africa	54.3	53.2	South Korea	4241	4530	Morocco	37.4	35.8	Philippines
Zimbabwe		52.2	Slovenia	460	703.4	Indonesia	25.7	21.8	Azerbaijan
Spain	22.1	21.5	Canada	18366	16723	China	47.2	48.8	Iran
Sweden	14	16.7	United States	23277	24556	Philippines	64.8	63.8	Ghana
Switzerland	12.2		Australia	39930	40951	Nigeria	68.2	67.7	Indonesia
Thailand	25.1	37.5	UK	2501	2785	Algeria	36.9	37.6	Ecuador
Trinidad T.	21.9	23.1	Sweden	8570	10020	Moldova	32.5	29.8	Rwanda
Tunisia		43.4	Argentina	2116	2885	Yemen	36.5	32.3	Egypt
Turkey	37.1	43.7	Peru	6321	7576	Ghana	34.1	38.9	Algeria
Ukraine	31	28.6	Mexico	1677	2275	Pakistan	36.1	37.6	Mali
Egypt	30.7	35.4	New Zealand	1758	2060	Zambia	27.9	26	Uzbekistan
UK	15.5		Finland	26098		Vietnam	61.2	60.9	Zimbabwe
US	16	16.3	Netherlands	33243	33763	India	57.7	61.4	Ethiopia
Burkina F.	38.1		Uruguay	352.2		Uzbekistan	24.6	21.9	Zambia
Uruguay	12.3	12.6	Switzerland	6632	8898	Zimbabwe	35.1	34.5	Pakistan
Serbia	28		France	3918		Mali	40	35.3	Nigeria
Uzbekistan		33.3	Norway		674.8	Rwanda	23.9		Burkina Faso
Yemen		33.7	Brazil		1059	Burkina Faso	19.2	15.6	Yemen
Zambia	49.6		Japan	798.8		Ethiopia	26.4	20.8	Iraq
Overall variance	14.7988			10016.2			12.1954		
Between variance	14.6988			9951.664			12.1689		
Within variance	2.9164			517.7039			1.6234		

Note: The table shows information on three main variables: materialism (measured by item v71 from World Value Survey), consumption (household consumption per capita) and innovation (measured by Global Innovation Index). The ranking of each variables was ordered by the mean value of two periods. The last three rows indicate the overall, between and within variance of each variable.

Table A.2 List of control variables

Variable name	Description	Sources
Initial consumption	Household final consumption expenditure per capita is the market value of all goods and services weighted by population. Data in constant 2010 US dollar.	World Bank National Accounts; and OECD National Accounts data files.
Unemployment	Unemployment is the percentage of labour force that is without work but available for and seeking employment. Definitions of labour force and unemployment differ by country.	International Labour Organization, Key Indicators of the Labour Market database.
GDP growth	GDP per capita growth is the annual percentage growth rate of GDP per capita based on constant local currency.	World Bank National Accounts; and OECD National Accounts data files.
Real interest rate	Lending interest rate adjusted for inflation which is measured by the GDP deflator	International Monetary Fund; International Financial Statistics; World Bank data for GDP deflator.
Saving rate	Gross savings (% of GNI) are the difference between gross national income and public and private consumption, plus net current transfers.	World Bank National Accounts
Inflation	Inflation, or GDP deflator (%) is the ratio of GDP in current local currency to GDP in constant local currency.	World Bank National Accounts; OECD National Accounts
Initial level of GDP	Initial GDP per capital (first year of the five-year period)	World Bank National Accounts; and OECD National Accounts
R&D spending	Percentage of research and development spending in GDP (both private and public sector)	World Bank National Accounts; OECD National Accounts data files.
Foreign direct investment (FDI)	Foreign direct investment, measured as percentage of GDP	World Bank National Accounts; OECD National Accounts data files.
Population size	Total population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship.	Original sources include United Nations Population Division, Eurostat, and U.S. Census Bureau. Obtained from World Bank Data Bank
Urbanization	Urban population refers to percentage of people living in urban areas as defined by national statistical offices.	The United Nations Population Divisions
openness	Measured by terms of trade as percentage of GDP	World Bank National Accounts; OECD National Accounts data files.
Education	Average years of schooling	UNESCO
Export intensity	Export as percentage of GDP	World Bank National Accounts; OECD National Accounts data files.

Note: The table describe all control variables used in regression analysis. Although the original data sources are different, data on all variables can be found in *https://data.worldbank.org/*. Observations on

all variables are annual based, and the mean value for each of the five-year period was entered into panel data set (except for initial level of GDP and consumption). Missing data on saving rate, GDP are filled with newest available date data. Wherever World Bank data source is not sufficing, data from IMF or national statistics departments was used.