# Determinants of the link between financial and economic development: Evidence from a functional coefficient model

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A B S T R A C T

Noting that "one size does not fit all" in the case of the finance–development (FD) relationship, a growing body of literature has recently focused on uncovering economic conditions under which financial development could be beneficial (detrimental) to economic development. We look into these conditions by means of a flexible semiparametric approach that allows the long-run FD link to depend on measurable economic factors. Using annual data for 73 economies spanning the period 1975–2011, we find that the impact of finance on economic development is generally stronger in high-income than low-income economies. However, allowing for intra-group variations reveals the importance of other factor variables in explaining the FD link. For instance, increasing financial development strengthens the FD link while increasing government size weakens it. Moreover, the FD link could even be negative if low- and lower-middle-income economies have very large governments or are extremely open to international trade.

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## 1. Introduction

The importance of services and instruments of the financial system to the real economic sector has been recognized in the literature at least since Schumpeter (1911). However, there are economists who argue that finance does not matter to economic development. According to this view, either the financial system passively responds to the demand arising from the real sector and not vice versa (Robinson, 1952), or there is not at all a meaningful relationship between financial and economic development (Lucas, 1988). The intensive research on the link between financial and economic development in the last two decades has documented mixed results.[1]

Empirical studies on the relationship between financial and economic development mostly follow either of the following two research directions. The first group of studies attempt to test whether financial development matters for economic development—independent of an eventual reverse causal impact (e.g. King and Levine, 1993; Levine et al., 2000). While such studies try to immunize estimations of the impact of finance on development from potential biases induced by reverse causation from economic to financial development, they generally neither test the presence nor estimate the strength of this reverse causation. Often using cointegration and Granger causality tests, the second group of studies, however, explicitly examine the direction of causality between financial and economic development (e.g. Ang and McKibbin, 2007; Demetriades and Hussein, 1996). As an extension of the first research avenue, a growing body of literature has recently attempted to investigate underlying measurable economic conditions (henceforth factors) which might determine *the impact of finance on economic development* (henceforth the finance–development (FD) nexus/link/relationship).[2] These studies raise a question of substantive policy relevance: under what conditions is financial development

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[1] For instance, a significantly positive impact of financial development on economic development is documented in Christopoulos and Tsionas (2004), King and Levine (1993) and Levine et al. (2000). However, there are also studies which report that it is economic development which leads to financial development (Ang and McKibbin, 2007). In addition, a few studies have diagnosed a negligible impact of finance on economic development (Andersen and Tarp, 2003). See Levine (2005) and Ang (2008a) for extensive surveys of the theoretical and empirical literature on the relationship between financial and economic development.

[2] The two groups of studies use the phrase "FD nexus/link/relationship" with slightly different meanings. In the first group, as in this study, it means "the impact of finance on economic development". In the second group, however, it more broadly refers to "the (causal) relationship between financial and economic development". Similarly, the term "growth" is often used in the literature together with, or instead of, "development" even when it does not refer to the "rate of change" of income. In particular, studies focusing on the long-run FD relationship (e.g. Christopoulos and Tsionas, 2004; Demetriades and Hussein, 1996) use the level of real GDP per capita to measure economic "growth" or "development". It should be noted, however, that empirically distinguishing between "growth effects" and "level effects" of growth determinants is both complicated and less important as we are eventually concerned with improvements in welfare levels (Temple, 2000). Nevertheless, since the dependent variable in this study is GDP per capita, we prefer to use the term "development" instead of "growth". We thank an anonymous referee for encouraging us to deviate from the literature in this regard.

beneficial (detrimental) to economic development, i.e., are there complementary policies that should be in place for a positive FD relationship? (Yilmazkuday, 2011). This question has been addressed either by estimating the FD relationship for different economies grouped according to certain economic criteria (Rioja and Valev, 2004), or by applying threshold regressions (Ketteni et al., 2007; Yilmazkuday, 2011). To date, the levels of economic and financial development, government size, inflation and openness to trade have been suggested to have an impact on the FD nexus (Rioja and Valev, 2004; Rousseau and Wachtel, 2002; Rousseau and Yilmazkuday, 2009; Yilmazkuday, 2011). However, contrasting evidence has emerged with regard to the direction and strength of the factors' impact on the FD nexus. For instance, three studies have associated the highest positive FD nexus with three distinct stages of economic development: low (Huang and Lin, 2009), medium (Yilmazkuday, 2011) and high (Deidda and Fattouh, 2002). Moreover, existing studies have not uncovered economic conditions which could lead to a negative FD relationship as observed by Xu (2000).

The aim of this study is to re-examine if, and to what extent, the impact of finance on economic development depends on the level of economic development, financial development, government size, trade openness, financial openness and the rate of inflation of an economy. To this end, we start with common dynamic OLS models (Saikkonnen, 1991; Stock and Watson, 1993) regressing GDP per capita on financial development and other control variables. Subsequently, we employ a functional coefficient model (Cai et al., 2000; Herwartz and Xu, 2009). In this model, the parameter attached to financial development, which is our measure of the FD nexus, is allowed to depend on one of the above-mentioned potential factor variables. This approach has two important advantages over rival methods like threshold regressions or the use of interaction terms. First, using the global factor invariance test of Herwartz and Xu (2009), it is possible to formally test whether the factors under consideration significantly determine the FD nexus. Second, this approach yields clearer pictures of the sign and magnitude of the considered factor's impact on the FD nexus. Although a somewhat similar analysis is possible with threshold regressions, for example as in Yilmazkuday (2011), this however comes at a cost of estimating the FD nexus on a rolling window of a small segment of the available data. Moreover, threshold regressions impose a rather strong linear FD relationship within estimation windows. The functional coefficient modeling approach, on the other hand, utilizes full sample information and relaxes the linearity assumption in the spirit of nonparametric kernel estimation.

In addition to the use of a flexible semiparametric approach, the present study differs from related works in three further aspects. Firstly, most studies, including Ketteni et al. (2007), Rioja and Valev (2004) and Yilmazkuday (2011), convert annual time series to five-year averages to immunize empirical results against the effects of business cycle fluctuations. The problems of averaging data, however, have not gone unnoticed in the literature. For example, Ang (2008a) argues that averaging may induce a new type of correlation between time-averaged variables which could markedly differ from the correlation between non-averaged series. Besides, averaging obviously entails a significant (80%) reduction of the sample (Baltagi et al., 2009). In this study, we employ (non-averaged) annual data for 73 economies spanning the period 1975–2011. Secondly, recent studies have shown that financial openness has a significantly positive impact on both economic development (Bekaert et al., 2011) and financial development (Baltagi et al., 2009). This suggests a positive effect of financial openness on the FD nexus. However, financial openness may replace financial development in terms of key growth-promoting roles, for instance, the provision of risk diversification (Obstfeld, 1994). As a consequence, financial openness might also exert a negative impact on the FD link. In light of conflicting economic reasoning, thus, we empirically assess the net impact of financial openness on the FD link. Thirdly, to allow for heterogeneous impacts of the factors on the FD

nexus across income groups, we estimate distinct semiparametric models for low-, lower-middle-, upper-middle- and high-income economies.

To preview some results, the average FD link is found to be positive and to increase across income groups. Yet, there are significant variations within each income group. For instance, increasing financial development appears to strengthen the FD nexus while increasing government size generally weakens it. On the other hand, a negative FD nexus is diagnosed in low-income and lower-middle-income economies if the government size is very large or if these economies are highly open to international trade. Finally, the average FD nexus initially increases with the average level of financial openness, reaches a maximum in the lower-middle financial openness category and substantially declines thereafter. In sum, the FD nexus is found to depend on the levels of economic development, financial development, government size, trade openness and financial openness, but not on the rate of inflation.

Section 2 reviews briefly the literature on the factors behind the FD relationship. Section 3 describes the data and sketches both the parametric and functional coefficient models. Section 4 discusses empirical results. Section 5 concludes. Some technical issues of functional coefficient modeling are addressed in Appendix A, and lists of economies in each income group are provided in Appendix B.

## 2. Literature review

In this section, we briefly review the theoretical and empirical literature on the factors underlying the FD relationship. Several factors have been suggested in the literature to affect this relationship. We discuss each potential determinant in turn.

### 2.1. Level of economic development

The debate on the possible dependence of the FD link on the level of economic development can be traced back to Patrick (1966) who conjectures that finance leads to economic development at earlier stages of economic development while economic development induces financial development at later stages. The view that financial development is more beneficial to less developed economies is also shared by Fry (1995) and McKinnon (1973). However, Deidda (2006) and Greenwood and Jovanovic (1990) argue that minimum size requirements or huge startup and maintenance costs necessitate a certain critical level of economic development before financial development may foster economic development. In view of these conflicting conjectures, it is not uncommon to find studies estimating the FD nexus for distinct samples of high-income and low-income economies. The results are mixed, however. A cross-sectional study by De Gregorio and Guidotti (1995) shows that the FD link is stronger in low-income economies in comparison with high-income economies. These findings are supported by recent evidence from panel data based threshold analysis in Huang and Lin (2009). On the contrary, based on economy-specific Granger causality tests, Xu (2000) reports a weaker, and for some economies a negative, causality from financial to economic development in low-income economies. Similarly, Deidda and Fattouh (2002) and Hassan et al. (2011) have obtained a significantly positive FD nexus for high-income economies and a negligible FD relationship for low-income economies. On the other hand, Yilmazkuday (2011) finds that economies need to have a per capita income of $665 (in constant 1995 U.S. dollars) in order to benefit from financial development and the benefits start declining once the income level reaches $1636.

### 2.2. Level of financial development

Rioja and Valev (2004) have examined if the level of financial development impacts on the FD relationship. They find that a certain threshold level of financial development is required for a meaningful FD nexus. This is attributed to economies of scale that financial