A MARKOV SWITCHING MODEL TO FINANCIAL MARKET DEVELOPMENT AND ECONOMIC GROWTH

Pooja[1], Ankurita Bansal[2]
Guru Kashi University, Talwandi Sabo

ABSTRACT

As we show, there were a number of regime adjustments in the relationship between the financial sector's share, private saving, and growth in the United States between 1948 and 1996. On the basis of vector auto regressions on quarterly data, which allow for Markov switching regimes, the discovery was made. The data supports the premise that the relationship between financial development and economic growth unfolds in a progressive manner. Stepwise patterns can be seen in theoretical models when structural financial developments need fixed expenses. Although our data does not allow us to draw firm conclusions, our estimates of the relationships between variables are consistent with those predicted from such models. The adjustments are occurring at the same time as regulatory and market structural changes.**Keywords**: growth, Markov switching, saving, structural financial development, vector autoregression.

Introduction

Theoretically, structural changes in financial markets may be seen as a process of regime changeover. For example, when major changes occur, the process may be described as one of fast innovation, but when only modest changes are made, the process can be described as one of quiescence (Almonares, 2019). New financial instruments and transaction technology like computerised trading and automated teller machines, as well as significant legislative changes, are all examples of what we mean when we say "big structural financial development" (such as allowing banks to operate across state lines).

Fixed expenses are one of the reasons why structural financial developments occur infrequently. Financial diversification may be unable to insure a company's manufacturing technique until it has reached a certain degree of development. A rapid rise in the financial cost share may be connected to changes in the relationship between production growth and saving if such variables are substantial.

Background

If regime transitions can be discerned in the data, it is an empirical question as to what the distinctions between these variables may be. Thus, we conduct a Markov switching vector auto regression (MS-VAR) utilising quarterly data from 1948 to 1996 on the growth of nonfinancial corporate GDP, changes in gross private savings, and changes in the financial sector share (as a proxy for costs) of U.S. corporate GDP. A model like this one is ideal for our needs since we don't want to limit the timing of regime transitions (Nurfalah, et al. 2018). Rather of looking at long-term relationships between growth and financial development, we use a more discrete and recurrent approach than most of the existing research on financial development. According to the literature, this is the case. – Increasing the share of savings that are actually invested, improving social marginal productivity, or influencing private saving rates are three ways financial development may impact GDP. (Mishra, Rath, & Dash, 2020) offers a thorough analysis of the relevant literature.

There are multiple regime shifts in the MS-VAR model, and the predicted relations are consistent with a set of stylized expectations (Shahrestani, & Rafei, 2020). Even more importantly, these movements appear to be timed to correspond with substantial changes in law and financial market structure, which lends credence to the argument that these shifts are not statistical aberrations but rather represent actual economic regime changes.

Rationale

For the rapid-innovation regime, the variables are more volatile than in the quiescent period, and the average change in the saving rate is larger than in the latter. In addition, we show that the financial sector's share and growth rate assist anticipate the following period's shift in saving rates, and that all three factors seem to contain unique information for anticipating regimes. We now turn to a more in-depth look at how savings, economic growth, and financial sector participation could all interact.

Dynamics of Financial Costs, Saving, and Growth

Short-term effects of financial regime alterations are discussed in this section. Using this data, we can better understand how financial expenses, growth, and saving are intertwined. Financial development and growth are not clearly linked, as far as we can tell from the available research (Lanouar, & Goaied, 2019). As a result, the following explanation is heuristic rather than based on a formal model. The general properties of several newly explored theoretical models are, nonetheless, largely relied upon.

As a starting point, we believe that financial development is linked to long-term economic progress. The positive connection of financial development with growth is one of the few findings that appears to be somewhat resistant to the addition of different sets of control variables in recent cross-country regressions of growth on just about every imaginable variable. However, the issue of causality is still up for discussion. One probable cause of erroneous results is failing to take regime alterations into account when examining causation.

Theoretical background

We'd want to look at the notion that financial progress occurs in stages separated by a lapse in time. Shorter rapid-innovation regimes are sought as financial markets expand, as are longer quiescent regimes when novel market configurations are stabilised. A one-time transition from an undeveloped financial market to a more or less comprehensive financial market is documented in these articles. Technology that is less hazardous but on average less productive can be used to achieve diversification without financial insurance (Tsagkanos, Siriopoulos, & Vartholomatou, 2019). A capital externality creating growth and fixed information costs in financial markets are the driving forces behind Saint-expansion. Paul's Savings and economic growth will both benefit from the development of the financial sector when it is coupled with an assumption of low-risk preferences. (Mishra, Rath, & Dash, 2020), on the other hand, suppose that the technology itself has indivisibilities and financial externalities as a result of the absence of financial insurance. (Mishra, Rath, & Dash, 2020). There is no need for a positive savings impact to achieve the positive growth effect in this setup.

(Živkov, Đurašković, & Manić, 2019) expands on Saint-fundamental Paul's concept, pointing out that there may be a succession of less than full structural developments in financial markets. Precautionary savings can reverse growth-enhancing benefits, so long as the savings rate drops. The intertemporal elasticity of substitution's parameters have been estimated empirically, and they show a high tendency to save for the future. When financial

markets pool production risks and raise predicted future utility from consumption, this has a negative impact on saving.

As a proxy for costs, we examine short-run relationships between the financial sector share (as an indicator of financial sector expenses), growth rates g, and the rate of saving in US time-series data. It is important to know what dynamic patterns we would theoretically anticipate to see in the data before interpreting these results.

Stylized predictions

Our research is exploratory, and no specific model is explicitly tested. As a result, we make two assumptions:

1. There is a cost associated with structural financial changes that is fixed in relation to the amount of production.
2. In the long term, financial development boosts growth, although this influence is mediated by very sluggish dynamics.

Table 1
Hypothesized pattern of effects in different regimes

	Quiescent			Rapid innovation		
	ϕ_{t-1}	β_{t-1}	g_{t-1}	ϕ_{t-1}	β_{t-1}	g_{t-1}
ϕ_t	?	+	−	?	?	?
β_t	+/−	?	+/−	−	?	?
g_t	+	?	?	−	−	?

Table 1 summarises the predicted relationships based on these assumptions and generic model findings from the literature. Below, we've outlined some of the rationale for these expectations.

Theories based on closed-economy one-good models and articulated in a set of quantity relations underlie the following observations. In other words, changes in interest rates, as well as changes in relative prices, are entirely influenced by the quantity variables (Shahrestani, & Rafei, 2020). In the extremely simple framework on which we rely, this should be a reasonable initial approximation for the United States.

The financial-sector share

Using the financial sector's share as a proxy, we may estimate how much each unit of production costs to trade. As a result of rising output, the financial sector's share would be reduced (Tsagkanos, Siriopoulos, & Vartholomatou, 2019). It is expected that a greater rate of savings will raise transaction volume and hence the financial sector's share. In the quiescent regime, grows with and decreases with g, although these findings might be influenced by transaction scale and scope economies, changes in transaction technology, and so on. Cost increases resulting from increased fixed expenses will predominate in an era of fast innovation, making projections difficult.

The saving rate

Growth and the financial sector's involvement in the economy theoretically have unclear impacts on the rate of savings. In both circumstances, the projected utility of future consumption will rise as a result. Current savings are increased (decreased) when the intertemporal elasticity of substitution is high (low). Because of balancing

income and substitution effects, savings should at least be affected under the quiescent regime in the same way (Grillini, et al. 2019). The immediate impact on the saving rate of the rapid-innovation regime is a clear fall in the rate of saving. In addition, high prior growth rates of production due to rising transaction costs may lead to decreased saving rates.

. The Experimentation

Here, we look at empirical evidence for the intertemporal linkages between financial market changes, savings, and growth (Tsagkanos, Siriopoulos, & Vartholomatou, 2019). Using a vector autoregressive (VAR) model, we will allow it to specialise into an MS-VAR and therefore allow for alternative regimes to define the evolution of financial markets, saving, and growth to be characterised.

A two-regime VAR fits the data if it turns out that there is a moderately frequent and a much less frequent regime. This has a significant impact. The curse of dimensionality will effectively limit the number of parameters in the model due to the restricted quantity of data available. As a result, we'll only be comparing VAR (1) and MS-VAR (1) models in the next sections, even if findings for a VAR (4) are also included for comparison (Shahrestani, & Rafei, 2020). The estimates for the less frequent regime will also have low accuracy for the same reason, limiting their ability to be understood.

Summary of evidence

There are always new changes in the financial markets and regulatory frameworks connected with regime shifts. However, the nature of these developments might vary. There is more instability in the rapid-innovation regime, and certain rapid-innovation eras have been linked to recessions. This may be taken to infer that we're only seeing recessions and spikes in volatility that aren't directly related to the growth of finance (Chen, Zhu, & Zhong, 2019). Except for the 1981:4–82:3 recession, the movements do not match with the NBER-classified recession periods. Economic activity is more likely to undergo a regime transition when the economy recovers from a downturn than when it doesn't recover.

One may probably attribute part of the turbulence in 1975 to exogenous events like the dissolution of Bretton Woods, the conclusion of Vietnam War and 1973's oil crisis for example. MS-VAR estimates of fast innovation eras are not causally linked to structural financial trends, which is what we're saying. Rather, whatever the underlying causes, we can observe in the statistics that fast innovation is linked to financial market development and change.

There are significant financial occurrences that are not connected to periods of fast innovation. The 1987 stock market meltdown is one obvious example. Our examination of the financial history of the United States does not permit us to draw the conclusion that rapid-innovation regime development differs qualitatively from development in the quiescent regime (Shahrestani, & Rafei, 2020). As far as our findings are concerned, they are at least compatible with this theory. We are unable to disprove our theory because of the lack of activity in the financial markets during and around the projected periods of rapid-innovation.

Conclusions

Since the MS-VAR model can explain much of the data's apparent heteroscedasticity, we conclude that it is a good fit for our data set. Taking into consideration the probability of regime shifts while evaluating time-series relationships between financial development and economic growth is recommended (Nurfalah, et al. 2018). To a significant extent, these autoregressive patterns correspond to theoretical predictions.

Precautionary savings have been shown to be reduced as the economy has grown. This regime of fast invention appears to be following the predicted patterns even if they aren't fully understood. Numerous studies conducted by reputable institutions show a connection between new financial market developments and statistically predicted periods of fast innovation (Nademi, & Nademi, 2018). When fast-innovation regimes come into effect, regulatory reforms and the rapid emergence of new financial products and markets are tightly linked.

The traditional question of how financial development and growth are linked may be re-examined in light of this new findings. Our Granger causality study suggests that causal (predictive) impacts can only be detected from the financial sector's proportion of the economy and rise in the saving rate, respectively (Nurfalah, et al. 2018). According to our findings, these three factors may be used to draw conclusions regarding the regime change process.

To be clear, the no causality hypothesis only applies to one-quarter-ahead forecasts, and our findings have very little to say about longer forecast horizons. While it is possible that the time period discussed in the theoretical discussion could be longer than a quarter, the lack of Granger causality between the share of the financial sector and the growth rate should not be taken as conclusive evidence against the hypothesis that financial development is linked to economic growth (Lanouar, & Goaied, 2019). In order to resolve the issue, it does propose that the link's dynamics be adequately described.

References

Nurfalah, I., Rusydiana, A. S., Laila, N., & Cahyono, E. F. (2018). Early warning to banking crises in the dual financial system in Indonesia: The markov switching approach. *Journal of King Abdulaziz University: Islamic Econ.*, *31*(2), 133-156. https://repository.unair.ac.id/96483/

Almonares, R. A. L. (2019). Markov switching model of Philippine stock market volatility. *DLSU Business & Economics Review*, *29*(1), 24-30. https://dlsuber.com/wp-content/uploads/2019/08/3.pdf

Lanouar, C., & Goaied, M. (2019). Tourism, terrorism and political violence in Tunisia: Evidence from Markov-switching models. *Tourism Management*, *70*, 404-418. https://www.sciencedirect.com/science/article/pii/S0261517718302103?casa_token=wC6_IpmyWe4AAAAA:z8zdWkiJQMq72zNzP_9MU7-DrYP4I-foOtLefbpSxMBxIyo2XWhZ-SZ8e3EqmeSZ1G23HUGLTnRU

Shahrestani, P., & Rafei, M. (2020). The impact of oil price shocks on Tehran Stock Exchange returns: Application of the Markov switching vector autoregressive models. *Resources Policy*, *65*, 101579. https://www.sciencedirect.com/science/article/pii/S0301420719302843?casa_token=4HdVJ-jyxZ0AAAAA:sLmdDWutzYhI8whA2t1GfaLmqw23j5RZpcSAjTlwCOuROjWXcEzZr3azv9AwiidXFbphY61Dh-Ni

Tsagkanos, A., Siriopoulos, C., & Vartholomatou, K. (2019). Foreign direct investment and stock market development: Evidence from a "new" emerging market. *Journal of Economic Studies*. https://www.emerald.com/insight/content/doi/10.1108/JES-06-2017-0154/full/html?casa_token=P7flA6j86b8AAAAA:jiyHf9UFfUFBPHGQ9umwgDygIV4sRGYcQZbiq4iJRMeSx7IHehgX7edjPW4VmiDYKXmSyUuA_K1-2o-Yc1wWwxqg86Rr8bluMX1EUk1oD7C3vvsiwPRiUg

Živkov, D., Đurašković, J., & Manić, S. (2019). How do oil price changes affect inflation in Central and Eastern European countries? A wavelet-based Markov switching approach. *Baltic Journal of Economics*, *19*(1), 84-104. https://www.tandfonline.com/doi/abs/10.1080/1406099X.2018.1562011

Mishra, A. K., Rath, B. N., & Dash, A. K. (2020). Does the Indian financial market nosedive because of the COVID-19 outbreak, in comparison to after demonetisation and the GST?. *Emerging Markets Finance and Trade*, *56*(10), 2162-2180. https://www.tandfonline.com/doi/abs/10.1080/1540496X.2020.1785425

Chen, J., Zhu, X., & Zhong, M. (2019). Nonlinear effects of financial factors on fluctuations in nonferrous metals prices: A Markov-switching VAR analysis. *Resources Policy*, *61*, 489-500. https://www.sciencedirect.com/science/article/pii/S0301420717304956?casa_token=I23c9Wjle7wAAAAA:__6vzIY32X0zLwrmyh94WsI4CvFM1-gyCyf3SEwzTHSyMgmOgQ3C3mPRuKCMtF-30O7y-yIL5679

Grillini, S., Ozkan, A., Sharma, A., & Al Janabi, M. A. (2019). Pricing of time-varying illiquidity within the Eurozone: Evidence using a Markov switching liquidity-adjusted capital asset pricing model. *International Review of Financial Analysis*, *64*, 145-158. https://www.sciencedirect.com/science/article/pii/S1057521919300924

Nademi, A., & Nademi, Y. (2018). Forecasting crude oil prices by a semiparametric Markov switching model: OPEC, WTI, and Brent cases. *Energy economics*, *74*, 757-766. https://www.sciencedirect.com/science/article/pii/S014098831830238X