East Asia Monetary Integration and Long Term Economic Growth

John G. Kooti
Shippensburg University of Pennsylvania
Shippensburg, PA, USA
jgkooti@ship.edu

Feng Xu
Georgia Southwestern State University
Americus, GA, USA
fxu@canes.gsw.edu

Abstract

Monetary integration for ASEAN+3 economies has been paid significant attention in recent years. However, most studies have concentrated on the proposed mix of currencies and the use of the Chinese RMB as the anchor currency. In this research, we use exploratory factor analysis and switching regression model to study the influence of monetary integration upon economic growth. The empirical analysis results suggest that at current stage it is not optimal choice for ASEAN+3 members to implement one single currency exchange mechanism. Instead, a basket of currencies would be favorable for economic growths of all member economies.

1. Introduction

The Asian currency crisis of 1997, the latest world financial crisis, the unprecedented economic growth of East Asian countries, and the growing popularity of monetary and economic integration, have prompted the possibility of monetary and economic integration of Southeast Asian countries centered around China as the main engine of economic growth. Previous research has concentrated on de-dollarization or replacing the dollar as anchor of currency exchange through monetary integration (Yamashita, 2009). The focus of this paper is to provide a primary statistical research on the influence of monetary integration on long-term economic growths of ASEAN+3 countries.

Although monetary integration would expand interregional trade, problems may arise as a result of member countries' fiscal and monetary policies conflicting with the long-term sustainability of such integration. The recent problems in the Euro zone illustrate the potential magnitude of these challenges.
China has been growing at a rapid pace since their economic reform of the late 1970s. Its growth has been the result of expansion of exports mainly to advanced economies, particularly the United States. As part of export oriented policies, China devaluated its currency against the dollar from ¥1.8 in 1980 to as low as ¥8.83 per US dollar before its appreciation in 2005. Since 1980, China's economy has been continuing to grow at an

average rate of 10%. Because of its size, many experts continue to stress that China will be the engine of growth for East Asian countries. Hefeker and Nabor (2002) focuson the use of the Chinese yuan (RMB) in a regional basket arrangement. They focus on the process of regional monetary integration for East Asia similar to the European process and suggest designing a flexible system in which the relative weights of currencies shift over time, allowing the yuan's role to grow over time. This might work in the short run, but its long-run success is questionable given the challenges that any potential member may face. The recent monetary problem in Greece illustrates the difficulty of sustaining a true monetary integration.

2. Review of literature on economic integration

Kawai (2005), using measures of intraregional trade intensity (which control for a region's relative size in world trade), finds that trade integration in East Asia is higher than that among the EU-15 but slightly lower than that in NAFTA. Kawai (2005, 2007) also finds that intraregional Foreign Direct Investment (FDI) flows has been strong within East Asia where Japan has been the most significant source of FDI among the ASEAN countries and Hong-Kong is the main source of FDI for mainland China. In terms of labor mobility, Kuroda (2004) asserts that labor mobility has been high in East Asian countries. Chia (2006) maintains that there are instances of quite high cross-border labor mobility in some parts of East Asia, but notifies that labor mobility is mostly contract related rather than free movement of labor.

With respect to correlation of shocks and economic cycles, Kawai and Montonishi (2006) find that between 1980 and 2002 both output growth and output shocks were strongly correlated in East Asian countries. Gudmundsson (2008) asserts that trade integration has advanced far in East Asia whereas financial integration has been slow.

According to Gudmundsson (2008), economic integration in East Asia has mostly been market driven with some policy initiatives contributed to it. Several regional initiatives under the auspices of ASEAN+3 or the EMPEAP cooperation of central banks such as bilateral free trade agreements, bilateral reserve pooling among ASEAN+3 member countries, and Asian bond market development through the Asian Bond Fund have been implemented. But these initiatives have been very limited in comparison to the integration process in trade. Gudmandsson (2008) finds that the level of integration in trade and FDI among East Asian countries has been relatively high, but the level of integration in the financial markets is much lower. He also finds that the correlation of shocks and business cycles is inconclusive.

The motivations behind visions of monetary union in East Asia seem in some sense similar to those in Europe, in particular the perceived need for exchange rate stability in order to preserve and further promote trade integration. Kuroda (2004) makes this point forcefully: 'I would argue that the East Asian economies are well integrated, so that even a small intra-regional exchange rate misalignment can disturb trade and investment flows and create potential trade frictions among regional economies'. Furthermore, he makes the argument that eventually a single currency will be needed for the region as intermediate exchange rate regimes will become difficult to maintain with less regulated

capital movements – a process that is bound to be associated with further regional integration.

3. Modeling influence of monetary integration on economic growth

According to Yamashita (2009), integration of financial and monetary systems of ASEAN+3 nations can help create and maintain financial and exchange rate stability in East Asian region. The 1997 SE Asia financial crisis set necessity of establishing an effective liquidity safety mechanism in the region, during which the ASEAN+3 was established in December 1997. This resulted in the establishment of Chiang Mai Initiative (CMI) in May 2000, for creating a regional network of swap arrangements on liquidity support in case of currency risks (Kawai, 2005). Since 2003, the Asian Bond Market Initiative (ABMI) was created to facilitate regional growth and development.

Considering no substantial initiative to start foreign exchange policy coordination and significant dependence on U.S. Dollars of East Asian economies, Kawai (2005) suggests first adoption of a common currency basket and later a common currency unit to maintain exchange rate stability. Similarly, Yamashita (2009) proposes de-dollarization and establishing an Asian monetary system within which a regional exchange rate regime to be created. Following the economic integration process of regional economies, the previous rigid exchange rate policy of certain countries has been relaxed. For example, in July 2005 China switched from pegging its currency to U.S. dollar to a managed floating rate regime, Malaysia immediately followed with same switch. Park (2010) further argues that China should internationalize its currency and take a leading role in the financial and monetary integration process of ASEAN+3. And Takagi (2009) focuses on the importance of Japanese yen for maintaining the stability of Asian economic and international monetary systems.

However, due to diversity and heterogeneity (Kawai, 2005) of East Asian economies, financial and monetary integration within the ASEAN+3 framework may bring hurdle for economic growth of certain member countries based on the fact that member countries have different economic systems and are at different development stages. Convergence in financial and monetary institutions requires long term commitment of policy coordination and less control of sovereignty. Andersen and Moreno (2005) point out that greater integration may result in higher foreign exchange market volatility, and it can bring vulnerability for developing countries in case of external shocks, which is detrimental to their economic growth.

Based on above discussions on the effects of monetary integration, it would be of interest to policymakers if a clear conclusion can be made. In what follows, we will carry out a primary statistical study of the influence on economic growth from monetary integration of the ASEAN+3 economies.

3.1. Exploratory analysis of monetary integration

Monetary integration implies coordination and convergence of policy actions in foreign exchange markets from member countries. The commitment to and intensity of the integration influence an economy in multiple aspects, like the convergence of real interest rates which are simply a function of inflation levels and nominal interest rates, monetary supplies of member countries and relative exchange rate stabilities, etc.

To check the influence of monetary integration upon the economic growth, we need to first be able to measure the variable of monetary integration, which in fact is not observable. Thus, the model we build below would encounter a latent variable(s) case,

(1) $y_{ij} = f(x_{i,1},\ldots,x_{i,k},M_{ij}) + \varepsilon_{ij}$

Where y_{ij} is the dependent variable measuring economic growth level for country i at period j, $x_{1j},\ldots x_{kj}$ are covariates which influence the growth level at the jth time period, and M_{ij} is the latent monetary integration measurement for country i at period j. ε_{ij} is the error term. The format of Eq. (1) fits a panel data case, and based on certain assumptions, it can be developed into a random effects model or a stochastic time-series model which contains probability structure for the latent variable.

As will be discussed in what follows, due to limitation of data availability, in our analysis for measuring the latent monetary integration level, we pool data together and obtain estimates of the variable in a time invariant format. Hence, the model (1) will be reduced to be,

(2) $y_i = f(x_i,\ldots,x_i,M_i) + \varepsilon_i$

For measuring monetary integration level, although a confirmatory factor analysis may be applicable in which we can preset the number of construct to be one, we start with an exploratory factor analysis (EFA), with the purpose to identify number of latent constructs based on historical data.

The real data[1] included into the exploratory factor analysis are ASEAN+3 domestic interest rates, interest spreads, inflation rates, total reserves including gold, M2 growth rates, exports as percentages in GDP, and currency exchange rates against US dollars given dependence of ASEAN+3 economies on the U.S. and de facto pegging their currencies at certain levels to the U.S. dollar. It is reasonable to assume that all of these variables are influenced by monetary integration level. In this study, we are using annual data due to its public availability. Of course, it's more appropriate to use monthly (or even weekly) data since the variability (e.g., the stability of exchange rate measured in its standard deviation) and changes in these variables can provide more details of the influence from the monetary policies. And we focus on period from 1997 to 2010, due to the facts that ASEAN+3 framework was established in 1997 and most data are not available for the period after 2010.

[1]Data source: The World Bank Open Data Services; The World Bank National Accounts Data; IMF International Financial Statistics and Data Files; ASEAN Statistical Yearbook 2001, Yearbook 2003, Yearbook 2004, Yearbook 2005, Yearbook 2008 and Yearbook 2010. Missing values excluded.

Applying the EFA model using R language for monetary integration, we obtain the following figure (Figure 1) of variance partitioning due to each principal component against the component number. From the plot, we note that the first factor capture the majority (99.378%) of the variance in original data. It's consistent to the presumption that the level of monetary integration has significant impacts on those seven variables included in the EFA analysis.

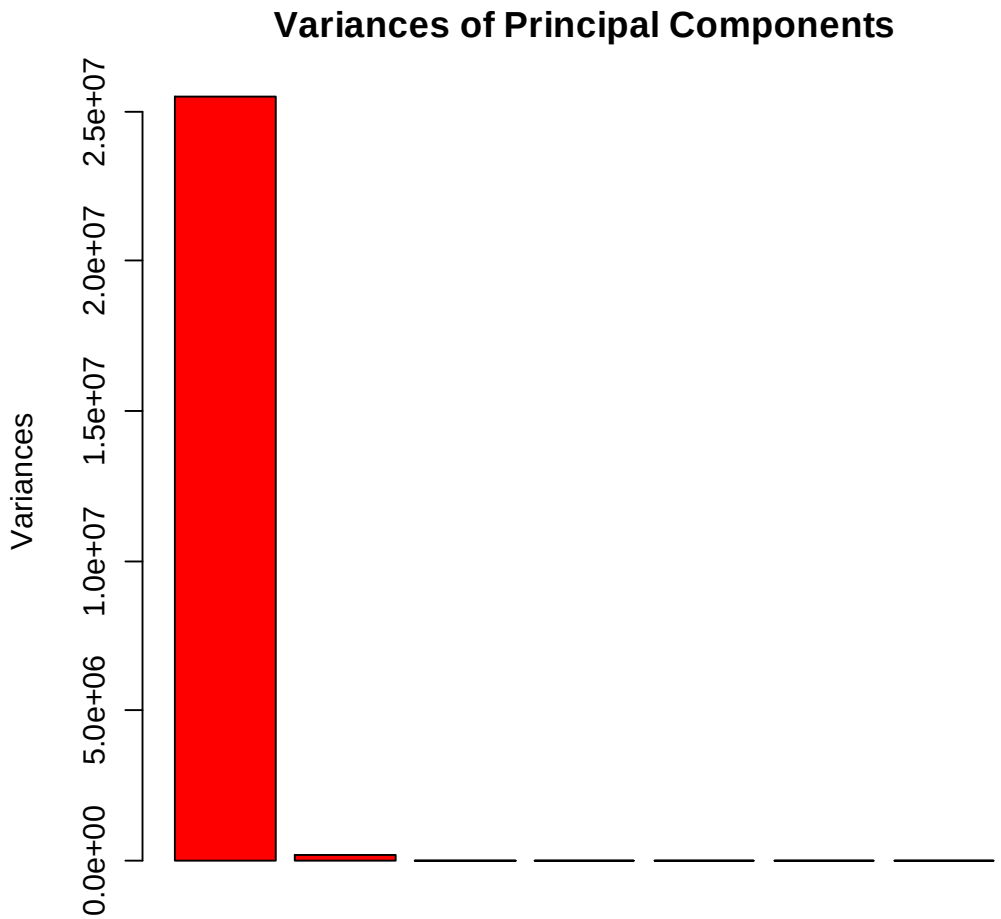

Figure 1: Plot of variances of principle components

Given the EFA analysis results, the latent construct of monetary integration can be measured using the loadings from the first eigenvector of rotation matrix, which is listed as follows,

$$M_i = 0.01798 * \mathrm{Res}_i - 0.999837 * Fx_i - 0.0003626 * Int_i - 0.00035 * Sp_i - 0.000452 * Inf_i - 0.0012 * M2_i + 0.00087 * Exp_i \quad (3)$$

where *Res* stands for reserves measured in US$billion, *Fx* stands for average exchange rate of local currency per US$, *Int* for domestic interest rate, *Sp* for interest rate spread, *Inf* for consumer price inflation rate, *M2* for money and quasi money growth rate, and *Exp* for exports as percentage of GDP.

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Standard deviations:
[1] 5048.911486  395.265356   53.390861   18.806553    8.678463    5.012928
[7]    3.353619

Rotation:
                          PC1          PC2          PC3          PC4
reserves         0.0179806387 -0.999386617  0.029392125 -0.005394279
exchangerate    -0.9998370061 -0.017953967  0.001385612  0.001134092
interestrate    -0.0003626275  0.003092130 -0.007609467 -0.154088553
Interestspread  -0.0003500583  0.001630272  0.002098196 -0.051570599
inflation       -0.0004521790  0.004859430  0.013131037 -0.708056089
M2growth        -0.0012003747  0.002586167  0.007983041 -0.687044864
exports          0.0008708993  0.029351720  0.999417692  0.013882954
                          PC5           PC6           PC7
reserves        -0.0014742319  0.0002656374  0.0028012843
exchangerate    -0.0005725635  0.0001194902 -0.0002609658
interestrate    -0.0415927932  0.5588644483  0.8137135178
Interestspread   0.0355716000 -0.8263711631  0.5596236706
inflation       -0.6919597284 -0.0684165763 -0.1223570106
M2growth         0.7198506568  0.0073329018 -0.0982789778
exports          0.0029942842  0.0068223905  0.0073312603
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Figure 2: Standard deviation and rotation matrix outputs for EFA analysis

3.2. Empirical analysis of economic growth based on monetary integration

With the measurement of latent construct for monetary integration, we can include it into Eq. (2) to study its influence on economic growth of ASEAN+3 countries. We subscribe to GDP per capita to be the variable measuring economic growth, and use its logarithm as the dependent variable in our analysis. GDP per capita is commonly used in economic researches and maybe the most important measurement of development level of socioeconomic and other areas in regarding to life well-beings for people in a country, as it's reasonable to argue that higher GDP per capita implies higher life conditions in terms of infant mortality, life expectancy at birth[2], education level, etc.

Besides missing values of some variables in regarding to certain ASEAN+3 countries, we note that for Myanmar, there is no record of GDP per capita based on data provided by The World Bank. And ASEAN statistics as well as other sources like IMF offer some incomplete and inconsistent (like different recorded values for some variables) data, in which case we only include available data published in most recent ASEAN Statistical Yearbook, and exclude all missing or conflicting values from this analysis. We mainly focus on using data published by The World Bank, and resort to sources from IMF and ASEAN organization only when there is no record in The World Bank data source.
As previously mentioned, there exists argument that monetary integration may have different impacts on economies at different development stages. In our modeling here, we

[2] The data collected in this study, after excluding missing values, reveals significant (at 0.0001 significance level) correlation between GDP per capita and infant mortality ($r_{\text{GDP per capita, mortality}} = -0.62$) as well as between GDP per capita and life expectancy ($r_{\text{GDP per capita, life expectancy}}$) = 0.784).

can use a simple format of switching regression model to check the validity of the argument. In which case, the model listed in Eq. (2) can be modified to be,

$$(3) \quad \ln(GDP_i) = f(x_i,\ldots,x_i,M_i,\sum_j Ind_j * M_i, lagged_i) + \varepsilon_i$$

where Ind_j is an indicator variable of development stage for a specific ASEAN+3 economy, $lagged_i$, i is one period lagged observation of y_i which is used to capture influences from other influential variables which are not available to be included in the model.

Based on country classification used in The World Bank publication, all economies can be classified according to levels of Gross National Income (GNI) per capita. Thus, we accordingly classify Cambodia and Myanmar to be low income (≤$1,025) economies, with $Ind_1 = 1$ in Eq.(4). Indonesia, Lao PDR, Philippines and Vietnam are classified as lower middle income countries with $1,026 ≤ GNI per capita ≤$4,035. For these economies, in our model we set $Ind_2 = 1$ in Eq. (4). China, Malaysia and Thailand are classified in the group of upper middle income countries ($4,036 ≤ GNI per capita ≤$12,475), and we use $Ind_3 = 1$ to categorize these three economies in the modeling. The rest economies belong to high income category.

Since majority of ASEAN+3 economies have dependence on foreign direct investment, we include variable FDI into model of Eq.(4), which is net inflows of foreign direct investment measured in US$billon. Besides, as all ASEAN+3 are export oriented and have characteristic of high savings rate to boost investments for higher economic growth, two additional covariates, CurrentAcct and Savings, are included into the model to capture influences from them upon the economic growth. CurrentAcct stands for current account balance, measured in US$billion, and Savings is gross savings percentage of GDP. All data are provided by The World Bank open data services.

We run the model in two different formats. The first one is a regular linear regression model, in form of

$$(4) \quad \ln(GDP_i) = f(M_i, FDI_i, CurrentAcct_i, Savings_i, lagged_i) + \varepsilon_i$$

which analyzes influences from monetary integration at an aggregate level. Then we apply the switching regression model as

$$(5) \quad \ln(GDP_i) = f(M_i, FDI_i, CurrentAcct_i, Savings_i, lagged_i, \sum_j Ind_j * M_i) + \varepsilon_i$$

The empirical analysis results are shown in the following tables.

Table 1: Coefficient estimates of regular regression model

Variable	Coefficient Estimate	SE of Coefficient	t Statistic	p-value
Intercept	5.3813	0.16278	33.05842	0.00000
M	0.0000415	1.07532E-05	3.85955	0.00017
FDI	-0.017205	0.00426	-4.03864	0.00009
CurrentAcct	0.005022	0.001683	2.98457	0.00331
Savings	0.065928	0.006351	10.38087	0.00000
lagged	0.00008049	7.00822E-06	11.48470	0.00000
R-squre = 0.8771		R-square (adj.) = 0.87301		

Table 2: Coefficient estimates of switching regression model

Variable	Coefficient Estimate	SE of Coefficient	t Statistic	p-value
Intercept	5.33563	0.15419	34.60510	0.00000
M	-0.00094	0.00013	-7.03126	0.00000
FDI	-0.01239	0.00382	-3.24753	0.00144
CurrentAcct	0.00501	0.00144	3.47308	0.00067
Savings	0.05960	0.00579	10.28613	0.00000
lagged	0.00008	0.00001	13.19228	0.00000
IND1*M	0.00102	0.00014	7.38831	0.00000
IND2*M	0.00097	0.00013	7.31650	0.00000
IND3*M	-0.01210	0.00414	-2.91985	0.00405
R-squre = 0.912977		R-square (adj.) = 0.908273		

From the modeling results, we note that all coefficients are statistically significant at 0.01 level for both models. In general, monetary integration has positive impact on economic growth, which is consistent to the common understanding. Albeit, while we check its influence for countries at different economic development levels, we note that for high and upper middle economies, monetary integration casts negative impacts on increasing rate of GDP per capita, which implies that joining a monetary integration mechanism would benefits those countries more among ASEAN+3 system which are at low and lower middle levels of their economic development. And for upper middle and high income economies, the vulnerability and less control on domestic monetary system seem to decrease the benefits from liquidity safety provided by the integration.

The difference of impacts corresponding to different economic development levels is likely due to the reason that upper middle and high income economies have more complicated economic systems which focus more on effectiveness of their domestic policies and which reduce the tolerance to external shocks. Also it may be the result that currently the monetary integration in ASEAN+3 region is only at its initiating stage, which lacks strong commitment and inefficient cooperation mechanism. Considering historical mistrust between Japan and other ASEAN+3 countries and geopolitical tension in the region, all these factors cast obscurity on the effect of monetary integration.

Therefore, in considering whether using a basket of currencies or using Chinese yuan and/or Japanese yen as anchor currencies, based on analysis above, these might not be good choices for upper middle and high income ASEAN+3 members. And in case that it is necessary for ASEAN+3 countries to establish an exchange mechanism so that member

countries can gain collective bargaining power in world trades, the mechanism of using a basket of currencies would be favored by majority of members over using Chinese and Japanese currencies as the anchor, due to its being less intensive in level of monetary integration.

An interesting point in modeling results is that, after taking into account of monetary integration, FDI has negative influence on the logarithm of GDP per capita. This may be due to the strong correlation between FDI and variables used to obtain the latent construct of monetary integration, and due to heterogeneities existing in economic and financial systems of ASEAN+3 countries.

4. Concluding Remarks

Monetary integration has been considered as an effective mechanism to maintain liquidity stability and help long run economic growth. It requires long term commitment and policy coordination from all member countries. The 1997 Asian financial crisis necessitates the process of financial and monetary integration for ASEAN+3 countries. Albeit, till now this monetary integration process is still at its initial stage, which is lack of solid institutional construct.

For ASEAN+3 members, they have great heterogeneities in economic, social and political systems. In this study, we implemented exploratory factor analysis to provide a useful measuring tool for latent monetary integration, following which we proposed switching regression model to test the impacts of monetary integration on long run economic growths of ASEAN+3 countries with different socioeconomic development levels.

Based on analysis results discussed above, we note that monetary integration benefits the economic growth of less developed countries in the ASEAN system. But it lacks solid evidence that at current stage, the upper middle and high income level economies would support the establishment of an exchange mechanism within the ASEAN+3 framework using a basket of member currencies or using either Chinese yuan or Japanese yen as the anchor currency except the host countries of these two currencies.

For the monetary integration to support long run economic growth for all members, it needs effective coordination mechanisms to be established first in intra-region and international trades, as well as in financial and economic policies. This in turn requires mutual trusts from each member and responsibilities from leading countries.

To further study the relationship between monetary integration and economic growth, when data becomes available, a latent stochastic model can be applied to measure the integration level, which can then enable studies of more sophisticated analyses, such as random effects model and stochastic time series models.

Reference

Andersen, P., and Moreno, R., 2005. Financial integration: an overview. Bank of *International Settlement (BIS) Papers No. 23*. from: http://www.bis.org/publ/bppdf/bispap23.pdf#page=9 .

Chia, S. Y., 2006. Labor Mobility and East Asian Integration. Asian Economic Policy Review, 1, 2, 349-367/

Gudmundsson, M., 2008. Near-term exchange rate flexibility in east Asia: precursor to regional monetary union? Pacific Economic Review, 13, 62–82. doi: 10.1111/j.1468-0106.2007.00390.x

Hefeker, C., and Nabor, A. 2002. Yen or Yuan? China's Role in the Future of Asian Monetary Integration. HWWA Discussion Paper No. 206. http://dx.doi.org/10.2139/ssrn.354562

Kawai, M., 2005. East Asia economic regionalism: progress and challenges. *Journal of Asian Economics*, 16(1), 29-55.

Kawai, M., 2007. *Toward a Regional Exchange Rate Regime in East Asia.* Tokyo: Asian Development Bank Institute. from: http://www.adbi.org/discussionpaper/2007/06/13/2281.exchange.rates.east.asia/

Kuroda, H. 2004. A Single Currency for East Asia—Lessons from Europe, ADB Seminar paper. May 14, 2004, Jeju.

Park, Y. C., 2010. RMB internationalization and its implications for financial and monetary cooperation in East Asia. *China & World Economy*, 18(2), 1-21.

Takagi, S., 2009. Internationalizing the yen, 1984-2003: Unfinished agenda or mission impossible? *BOK-BIS Seminar on Currency Internationalization: Lessons from the Global Financial Crisis and Prospects for the Future in Asia and Pacific*, Mar. 19-20, Seoul.

Yamashita, E., 2009. Future targets for Asian regional integration. *Asia Europe Journal*, 7(1), 109-125.

Biographies

Dr. John G. Kooti is Dean and Professor of Finance in the John L. Grove College of Business at Shippensburg University. Prior to that, he was the Dean of the School of Business Administration at Georgia Southwestern State University for twelve years. He received his Post Doctorate in Finance from the University of Florida, and Ph.D. from Michigan State University. Kooti's research interest includes the areas of economics, finance, and economic development.

Dr. Feng Xu is an Assistant Professor at Georgia Southwestern State University. Besides receiving his Ph.D. in Decision Sciences from The George Washington University, he also holds M.S. in Economics and MBA in Finance, along with more than four years working experience in financial, operations management and business analysis in both China and the USA.