

Spillover effects of internal audit effectiveness among commercial banks



Hanh Hoang Thanh*, Dung Ngo Tien

Accounting Auditing Department, Academy of Policy and Development, Hanoi, Vietnam

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ABSTRACT

This study explores the multifaceted landscape of factors influencing the effectiveness of internal audit within the context of Vietnamese commercial banks. While a plethora of literature exists on the determinants of internal audit effectiveness, an unexplored dimension is the examination of spillover effects amongst companies operating within the same industry. This research addresses this gap by investigating not only the factors that impact the effectiveness of internal audit in Vietnamese commercial banks but also the inter-bank spillover effects of such effectiveness. Utilizing data obtained from 24 commercial banks listed on the Vietnam Stock Exchange and Vietnam Upcom (The Unlisted Public Company Market), we employ a Bayesian spatial regression model (a robust analytical tool) to conduct comprehensive analyses of the interrelationships and co-movements of internal audit effectiveness across these banks. Our findings offer empirical support for the positive effects of key determinants, namely, the "Competence of the IA Department," "IA Independence," and "Management Training Ground," on the effectiveness of internal audit in Vietnamese commercial banks. Notably, our results also validate the significant positive inter-bank spillover effect of internal audit effectiveness. This underscores the importance for banks to collectively prioritize measures aimed at enhancing the quality of internal audit, including the establishment of a joint internal audit association and the organization of collaborative training initiatives for internal audit personnel.

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1. Introduction

Internal auditing (IA) is a critical instrument for monitoring and controlling an organization's governance and operations. An internal audit function ensures that a firm's board of directors, senior management (and company supervisors) are satisfied with the quality of the company's internal control system. Because of the increased regulatory requirements and focus on governance and risk management, the quality of IA attracts the attention of all audit stakeholders (Cohen and Sayag, 2010).

Based on Beckmerhagen et al. (2004) and Shu et al. (2010), the IA performance evaluation is usually performed by comparing the actual performance with the goals, which includes the measuring of accomplished internal audit effectiveness (IAE). However, the term "effectiveness" is defined differently in some studies. Arena and Azzone

(2009) defined "effectiveness" as "the capacity to obtain results that are consistent with the target objective" while Dittenhofer (2001) defined the term as "the achievement of the desired condition." Fortunately, this condition can be quantified in degrees, despite the fact that it is frequently not clearly defined. According to Turetken et al. (2020), there are 11 recognized indicators utilized in the literature for assessing IAE, which are classified into two categories: Objectively measured effectiveness and perceived effectiveness.

Lenz and Hahn (2015) divided the elements that influence the IAE into two categories: Supply and demand. The supply side includes elements based on internal auditors' self-assessment, whereas the demand side includes the opinions of external stakeholders (e.g., auditees). Turetken et al. (2020) found that one of the most widely researched elements (that affects IAE) in the available literature is the competency of the IA department. Furthermore, The International Standards for the Professional Practice of Internal Auditing (ISPPA) emphasizes the need for an internal auditing team that has the knowledge, skills, and other competencies required to fulfill their duties (Dellai and Omri, 2016). Furthermore, Dellai and Omri,

* Corresponding Author.

Email Address: hoangthanhhanh@apd.edu.vn (H. H. Thanh)

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Corresponding author's ORCID profile:

<https://orcid.org/0000-0001-7034-0105>

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(2016) claimed that other factors could strongly promote IAE as the management training ground since it can be utilized to train potential managers. Internal auditors can have a better grasp of the process, internal controls, and a wide range of information about the company by participating in IA activities. Researchers, on the other hand, express reservations about this feature, citing the influence that incorporating managers in IAs can have on the independence and objectivity of the IA (Yee et al., 2008). IA independence is seen as a critical factor in IA efficacy (Alzeban and Gwilliam, 2014). Dejnaronk et al. (2016) defined "independence" as "the freedom from conditions that threaten the ability of the IA activity to carry out IA responsibilities in an unbiased manner." In order for the internal auditors to conduct IA independently, safeguarding tools should be available in the IA department (D'Onza et al., 2015). Even though IAs have a high degree of freedom and autonomy, their capacity to accomplish their obligations inside an organization may be constrained (Al-Twajry et al., 2003; Alzeban and Gwilliam, 2014). Therefore, management support is crucial in assisting internal auditors in carrying out their tasks (Baheri et al., 2017). A supportive control environment, in which management recognizes the value of controls and the mechanisms that evaluate their effectiveness, can also help employees communicate with one another (Barišić and Tušek, 2016). Aside from internal considerations, the interplay between internal and external audit might also have an impact on IAE (Alzeban and Gwilliam, 2014).

Although the literature on factors influencing IAE is rich, none of the previous studies examine the inter-company spillover of IAE. Because companies within the same industry carry out business activities in a similar economic environment and thus generally use similar accounting practices (Abdo, 2016), we suspect that there will be a link of IAE among companies within the same industry. Besides, even in the same industry, it is likely that some companies have closer relationships than others, which could also affect the spillover of IAE. To answer this question, this study uses data from commercial banks listed on the Vietnam Stock Exchange and Vietnam Upcom (The Unlisted Public Company Market) to examine factors that influence IAE and the inter-bank spillovers of IAE. To model this complicated relationship, we employ the Bayesian spatial regression model for two reasons. First, recent developments in spatial econometrics have provided a powerful tool for performing thorough analyses of the linkages that are important for the co-movements of economic indicators. With this approach, we can easily capture the spillover of IAE among banks. Second, since our sample is quite small (because it is hard to interview top and senior managers of a bank), the use of the Bayesian approach could help to lessen the problem of biased estimation.

Our results are consistent with previous studies in confirming the sort of positive effects of

"Competence of the IA Department," "IA Independence," and "Management Training Ground" on the effectiveness of internal audit in Vietnamese commercial banks. Interestingly, our results also definitely confirm the significantly positive inter-bank spillover of internal audit effectiveness. It suggests that banks should literally pay attention and act together to improve the quality of internal audit such as establishing a joint internal audit association or holding joint training sessions for internal audit staff.

This study contributes significantly to the extant scholarly corpus in several noteworthy respects. Firstly, it is imperative to underscore that this investigation represents an inaugural attempt, to the best of our knowledge, at scrutinizing the phenomenon of inter-company spillover within the context of IAE. Secondly, it is essential to acknowledge the formidable challenges associated with acquiring comprehensive data pertaining to IAE, particularly information sourced from upper echelons of management. This predicament inevitably results in a relatively diminutive sample size. To rectify the potential biases inherent in such estimation processes, our methodology avails itself of the Bayesian technique, an approach that has hitherto been underutilized in extant literature. Thirdly, the discernible findings emanating from this study distinctly advocate for a deeper investigation into the prospect of inter-company spillover effects, specifically with regard to alternate performance indicators.

The ensuing sections of this paper have been structured in the following manner to facilitate a coherent and comprehensive exposition of our research: Section 2 expounds upon the methodological framework underpinning our study, Section 3 delineates the composition of our research samples, offering insight into pertinent descriptive statistics, Section 4 furnishes the empirical outcomes of our investigation, and, lastly, Section 5 proffers the conclusions drawn from our study.

2. Methodology

2.1. The Bayesian spatial regression model

To incorporate the spatial spillover effects among examined banks, we employ the spatial autoregressive model (SAR) that has a form:

$$y = \lambda W y + X \beta + \varepsilon, \\ \varepsilon \sim N(0, \sigma^2 I_n), \quad (1)$$

where, y is a vector of observations on a dependent variable, X is a matrix of regressors with an associated vector of coefficients β , ε is a vector of idiosyncratic errors. In this model, W is a connectivity matrix that imposes a neighborhood structure, with elements $w_{ij} > 0$ for neighbors i and j , where $i \neq j$ (the diagonal elements of W (w_{ii}) are set to zero). We discuss the detailed construction of W in Section 2.2. λ is a spatial parameter that

measures the strength of connectivity among entities in terms of the dependent variable's value. By using this model, we can account for both the impact of regressors on the dependent variable at one entity and the inter-spillover effects of the dependent variable among entities.

There are several estimation methods for the SAR model including the generalized method of moments (Kelejian and Prucha, 1998; 1999), maximum likelihood (Lee, 2004), and Bayesian methods (LeSage and Pace, 2009). Among them, the Bayesian estimation method has several advantages including 1) Bayesian methods can solve the problem of inference in maximum likelihood computed using numerical Hessians, which are not always very good; 2) Bayesian methods can be used to relax the assumption of constant variance normal disturbances made by maximum likelihood methods, resulting in extended models; 3) Bayesian estimation can solve the biased parameter values by estimating in conjunction with informative prior distributions. Since our sample size is quite small, we employ the Bayesian estimation in our analysis.

In Bayesian statistics, probability expresses a degree of belief. Bayes' theorem is used as a tool to update probabilities in the light of new information and is given by,

$$p(\theta|D) \propto p(D|\theta)p(\theta), \tag{2}$$

where, θ denotes a set of unknown quantities, D denotes observed quantities, $p(\theta)$ is the probability density of a probability distribution, and \propto reads as 'is proportional to'. The posterior probability, $p(\theta|D)$, is obtained by updating the prior information, $p(\theta)$, with the likelihood, $p(D|\theta)$. In our Equation (1), the unknown quantities are parameters λ , β , and σ . Following LeSage and Pace (2009), we adopt a normal-gamma conjugate prior for β and σ , and a uniform prior for λ . Specifically, $p(\beta) \sim N(c, T), p(\frac{1}{\sigma^2}) \sim \Gamma(d, \nu)$, and $p(\lambda) \sim U[0,1]$. Since we have no information about β and σ , the prior of these parameters, we use the diffuse prior for them. Specifically, we set c equal zero, T equal large number, d and ν equal zero.

The parameters β , σ , and λ in the SAR model can be estimated by drawing sequentially from the conditional distributions of these parameters. To implement this estimation method, we need to determine the conditional distributions for each parameter. The conditional distribution β follows from the maximum likelihood model:

$$\begin{aligned} p(\beta|\lambda, \sigma) &\sim N(\bar{b}, \sigma^2 B) \\ \bar{b} &= A(X'Sy + \sigma^2 T^{-1}c) \\ A &= (X'X + \sigma^2 T^{-1})^{-1} \\ S &= (I_n - \lambda W). \end{aligned} \tag{3}$$

The conditional distribution for σ^2 given the other parameters is proportional to an inverse gamma distribution with parameters $\frac{n}{2} + d$ and $e'e + 2\nu$. Specifically,

$$\begin{aligned} p(\sigma^2|\beta, \lambda) &\propto (\sigma^2)^{-\frac{n}{2}+d+1} \exp\left(-e'e + \frac{2\nu}{\sigma^2}\right) \\ e &= (I_n - \lambda W)y - X\beta. \end{aligned} \tag{4}$$

Finally, the conditional posterior distribution of λ takes the form:

$$\begin{aligned} p(\lambda|\beta, \sigma^2) &\propto |S(\lambda)| \exp\left[-\frac{1}{2\sigma^2}(S(\lambda)y - X\beta)'(S(\lambda)y - X\beta)\right] p(\lambda) \\ S(\lambda) &= (I - \lambda W). \end{aligned} \tag{5}$$

We then use Markov chain Monte Carlo (MCMC) methods to sample from the posterior distribution via the Metropolis-Hastings algorithm. We perform the estimation process in R software using the bsreg package (Kuschnig, 2022).

2.2. The spatial weights matrix construction

In our case, the spatial weights matrix measures the closeness of banks which captures co-movement in accounting fundamentals over time. Following Ross et al. (2019), our W is constructed using two parts W_1 and W_2 . Each component $w1_{ij(i \neq j)}$ in the matrix W_1 is the average of all pair-wise Pearson correlations in earnings and cash flows for banks i and j over a given period of time. Each component $W2_{ij(i \neq j)}$ in the matrix W_2 is the mean 1-R2 of the regression of firm i 's searning or cash flows on firm j 's. We then construct a matrix W^* whose components w_{ij}^* is the average of $w1_{ij(i \neq j)}$ and $1 - w2_{ij(i \neq j)}$. Finally, we row-standardize all elements of W^* to form the spatial weights matrix W (each element of W^* is divided by its row sum to create W^*).

For W_1 , the earnings correlation coefficient between a pair of firms may not capture the whole story in terms of fundamental similarity. For example, the firms may exercise different timing in their accruals and this will downwardly bias the earnings correlation coefficient. On the other hand, the cash flow correlation coefficient will capture the degree of co-movement in underlying cash flows overtime for this pair of firms. Averaging the pair-wise earnings and cash flow correlation coefficients provides a truer measure of the underlying fundamental co-movement than considering each of these separately since it captures both dimensions of accrual earnings and cash flow.

We add W_2 to the construction of the spatial weights matrix since the correlation in W_1 only captures the extent to which firm j 's earnings change relative to j 's mean when firm i 's earnings change relative to i 's mean. In contrast, the W_2 captures that portion of the variation in firm i 's earnings that are not captured by variation in firm j 's earnings and is equivalent to 1 - R2 where R2 is the percentage of variation in firm i 's earnings explained by variation in firm j 's earnings in an OLS regression of firm i 's earnings on j 's. Notice that $0 \leq w2_{ij(i \neq j)} \leq 1$. The closer W_2 is to zero the closer R2 is to 1 implying

that variation in firm *j*'s earnings can explain more variation in firm *i*'s earnings.

Notice that $w_{1ij(i \neq j)}$ is between negative and positive one while $w_{2ij(i \neq j)}$ is between zero and one. Thus $w_{1ij(i \neq j)}$ can tell us something about negative co-movement while $w_{2ij(i \neq j)}$ cannot. Finally, as discussed earlier, values of $w_{2ij(i \neq j)}$ closer to zero indicate closer groups while values of $w_{1ij(i \neq j)}$ closer to one and negative one indicates closer groups. Because of the potential confusion we calculate $w_{ij(i \neq j)}^*$ as follows:

$$w_{ij(i \neq j)}^* = \begin{cases} \frac{1}{2}[w_{1ij(i \neq j)} + (1 - w_{2ij(i \neq j)})] & \text{if } w_{1ij(i \neq j)} \geq 0 \\ \frac{1}{2}[w_{1ij(i \neq j)} - (1 - w_{2ij(i \neq j)})] & \text{if } w_{1ij(i \neq j)} < 0 \end{cases}$$

3. Data description

The research sample comprised 24 commercial banks, all of which are publicly listed on the Vietnam Stock Exchange and Vietnam Upcom. Within each of these banking institutions, a minimum of five individuals were subject to interviews, encompassing top-tier executives and mid-level managers. Specifically, this cohort included members of the board of directors, members of the board of management, as well as middle managers who held positions as department heads or deputy department heads. These interviews were conducted to solicit insights pertaining to their assessments of IAE within their respective banks, along with an

exploration of various factors exerting influence on the IAE metric. Subsequent to meticulous data cleansing procedures, the aggregate count of valid observations stood at 108.

We use a 5-point Likert scale to assess the interviewees' evaluation of each indicator. For IAE evaluation, we ask managers to evaluate five indicators including "Fulfillment Degree of Internal Audit Plan," "Time required to complete audit plan," "Audit Value," "Perceived Internal Audit Effectiveness," and "Perceived Added Value to Organization." Noted that we assume that all of these indicators have the same weights in calculating IAE (no indicator is more important than others in accessing IAE). The Cronbach's alpha for IAE is 0.94.

For factors impacting IAE, we focus on 6 constructs including "Competence of the IA Department," "IA Independence," "Management Training Ground," "Management Support for IA," "Interaction Between Internal and External Audit," and "Supportive Control Environment." Each construct is evaluated by 4-5 questions. We then check the Cronbach's alpha of each construct to make sure of their reliability. The results show that all constructs have Cronbach's alpha greater than 0.86.

Since all constructs, including IAE and impacting factors, have high reliability, we take an average of all respondents to calculate one final value for each construct per bank. Table 1 summarizes the summary statistics for those constructs for all banks.

Table 1: Summary statistics for constructs (variables)

Constructs (variables)	Code	Mean	Standard deviation	Min	Max
Internal audit effectiveness	IAE	4.371	0.291	3.9	4.8
Competence of the IA department	X1	4.245	0.355	3.7	4.9
IA independence	X2	4.235	0.403	3.6	4.9
Management training ground	X3	4.344	0.424	3.6	5.0
Management support for IA	X4	4.284	0.342	3.5	4.9
Interaction between internal and external audit	X5	4.478	0.285	4.0	4.9
Supportive control environment	X6	4.465	0.334	3.9	5.0

4. Results and discussions

This section reports Bayesian estimation results using both non-spatial and spatial regression models. For the MCMC process, we use the first 500 draws as a burn-in process and report the next 1000 draws. In Bayesian estimation, we examine the mean (or median) of the after burn-in MCMC process to conclude the effects of regressors on the outcome. The effects are considered "significant" if the 95% credible interval (from 2.5% to 97.5% percentiles of the MCMC process) does not contain zero.

4.1. Model without spatial term

This section reports the results of non-spatial regression (model without spatial term). Table 2 shows the Bayesian estimations for six regressors. Among the six examined impacting factors, our results confirm the positive effects of "Competence

of the IA Department," "IA Independence," and "Management Training Ground" on the effectiveness of internal audit in Vietnamese commercial banks. In contrast, "Management Support for IA," "Interaction Between Internal and External Audit," and "Supportive Control Environment" seem to have no impact on the IAE of banks.

It is not surprising that the competence of the IA Department is confirmed to be one of the most important factors affecting the effectiveness of IA. This result is consistent with the findings of Mihret and Yismaw (2007) and Dellai and Omri (2016). Al-Twajjry et al. (2003) suggested that the staffing of internal audit departments and the management of its staff is vital to the effective operation of IA and that unless they possess the necessary competencies the power of internal auditors may be diminished. Besides, internal auditors require a wide range of competencies to achieve satisfactory performance in the various hierarchical positions within internal audit departments. Competence requires knowledge

and professionalism that the auditor should acquire from education, on-the-job training, and experience. Thus, legislators set requirements that must be met before people are qualified and entitled to perform

audits (Paape, 2007). To increase the competence of internal audit staff, in addition to the entry requirements for the job position, managers should care about improving auditors' skills.

Table 2: Bayesian non-spatial regression model estimation

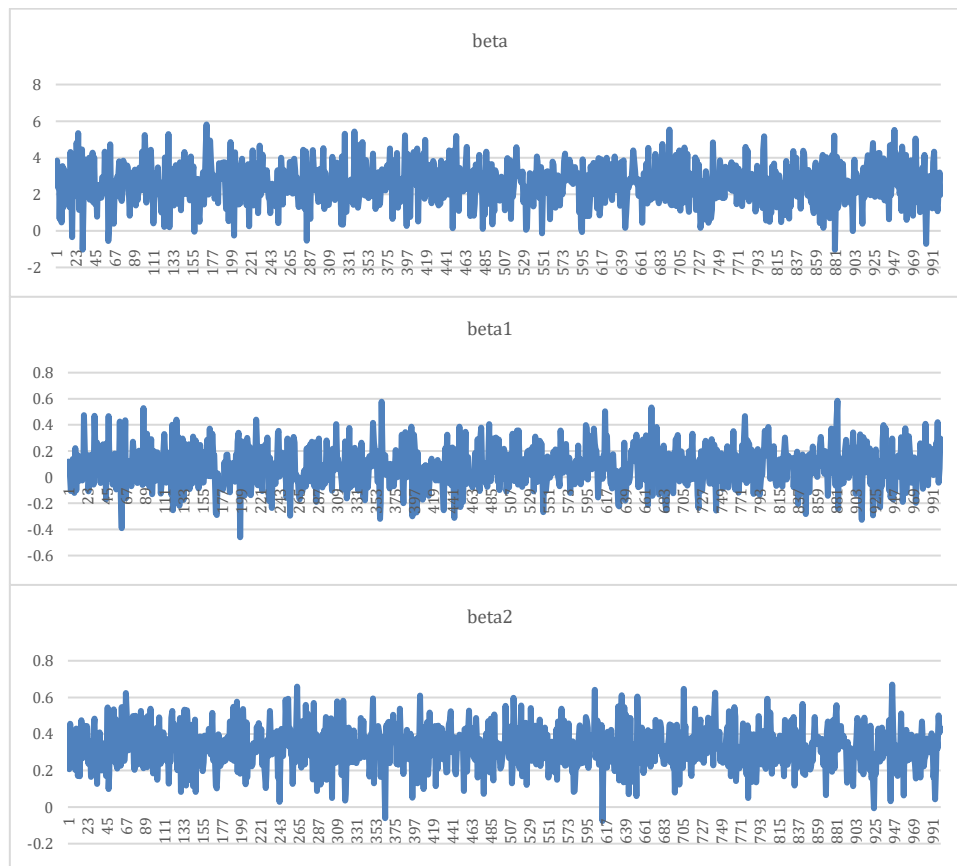
Constructs (variables)	Mean	Median	P2.5	P97.5
Constant	2.496	2.553	0.121	4.775
Competence of the IA department	0.284	0.289	0.187	0.365
IA independence	0.338	0.335	0.118	0.561
Management training ground	0.397	0.398	0.107	0.687
Management support for IA	-0.015	-0.017	-0.353	0.332
Interaction between internal and external audit	-0.164	-0.176	-0.474	0.190
Supportive control environment	-0.188	-0.191	-0.489	0.122

P2.5 and P97.5 show 2.5% and 97.5% percentiles (which is a 95% credible interval)

To carry out internal audit responsibilities effectively, it is imperative that independence is maintained at the highest standard. Maintaining independence helps internal auditors and the internal audit activity can make unbiased judgments and decisions based on the audit activities. It also keeps internal auditors free from any internal or external interference or obstruction with functional accountability being to the board, either directly or through an audit committee. Therefore, to promote the independence and authority of internal audit; there should be no aspect of the organization which internal audit should be restricted from looking at as it delivers on its mandate. Managers should care about adequate seniority and resource planning in order to ensure the independence of the internal audit activity.

The impact of management training grounds on IAE is quite controversial. While some studies argue that the management training ground improves IA effectiveness since the IA activities can be used to train potential managers, others are concerned about the fact that involving managers in IAs can have on IA independence and objectivity. Our results confirm the positive effects of management training grounds on IAE. However, banks' top managers should pay more attention to IA objectively when conducting management training grounds.

To confirm the convergence of our MCMC sampling, we examine the after burn-in MCMC process and report it in Fig. 1. The results show that all parameters' estimations have convergent MCMC draws.



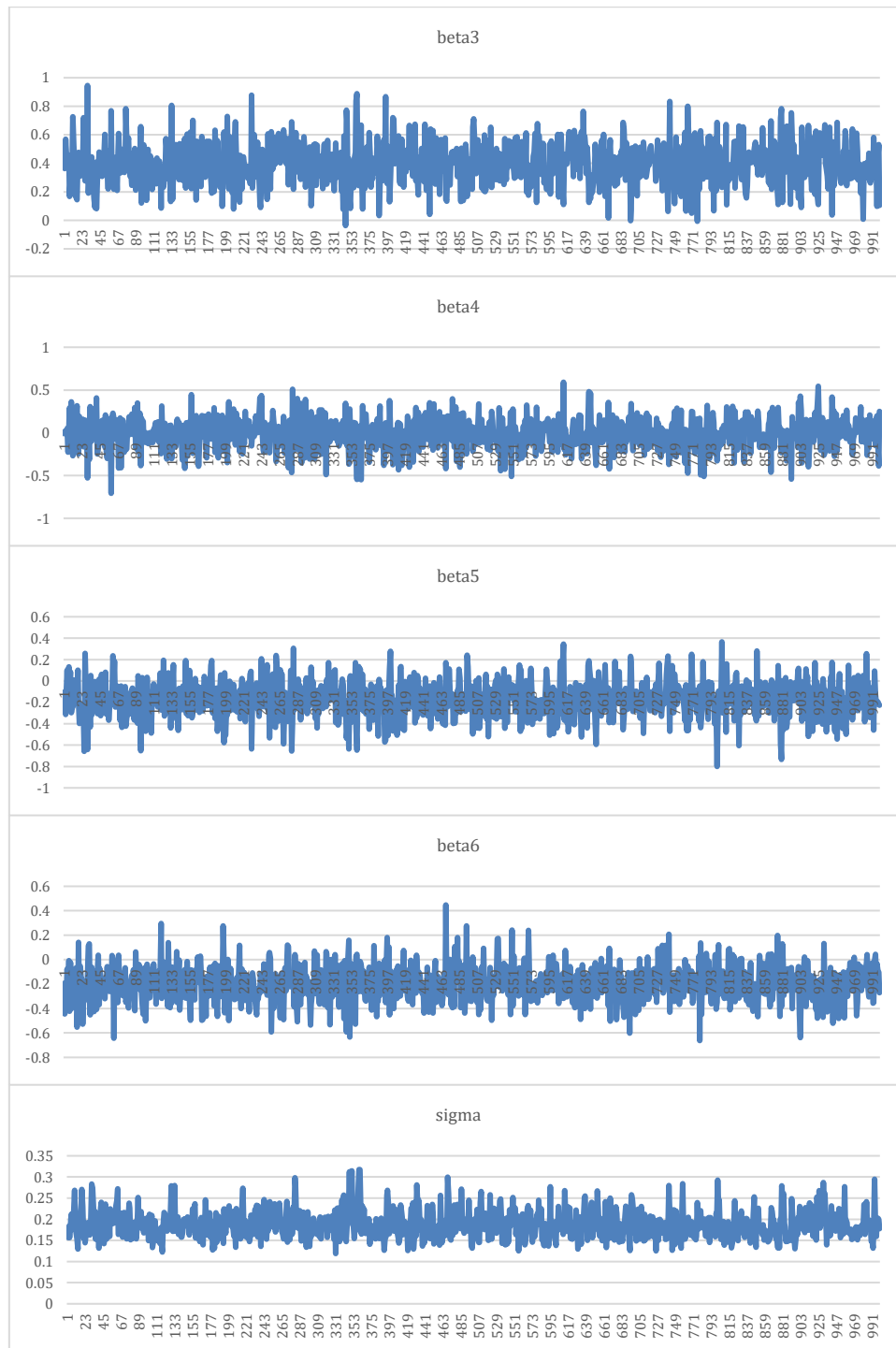


Fig. 1: MCMC estimation plot of the non-spatial regression; “beta” indicates MCMC draws of the constant; “beta1”-“beta6” are associated with X1-X6, respectively

4.2. Model with spatial term

We next examine the inter-bank spillover of IAE using the Bayesian spatial regression model. The spatial parameter is provided by λ in Table 3. The results of Table 3 once again confirm the significant positive impacts of “Competence of the IA Department,” “IA Independence,” and “Management Training Ground” on the effectiveness of internal audit in Vietnamese commercial banks.

The significant positive estimated λ confirms the inter-bank spillover of internal audit effectiveness. It indicates that the effectiveness of internal audit in one bank could also have an impact on other banks’

internal audit effectiveness. Besides, banks with closer relationships are more likely to have stronger spillover effects of internal audit effectiveness. Although no research has shown the spillover of IAE among banks, a number of previous studies have explained the association in management quality as well as performance among companies in the same industry. For example, Fallah and Ibrahim (2004) confirmed the knowledge (includes tacit knowledge) spillovers in technological clusters; Zollo and Reuer (2010) found out the experience spillovers across corporate development activities; etc. The obtained result implies a strategic imperative for Vietnamese commercial banks to collaboratively establish a

network aimed at enhancing the efficacy of their internal audit functions. Such a joint internal audit network would serve as a central hub for the exchange of invaluable internal audit experiences, the dissemination of expert guidance, the provision of high-caliber professional training, rigorous quality assessments, and vigilant oversight directed towards member banks. By fostering this collaborative

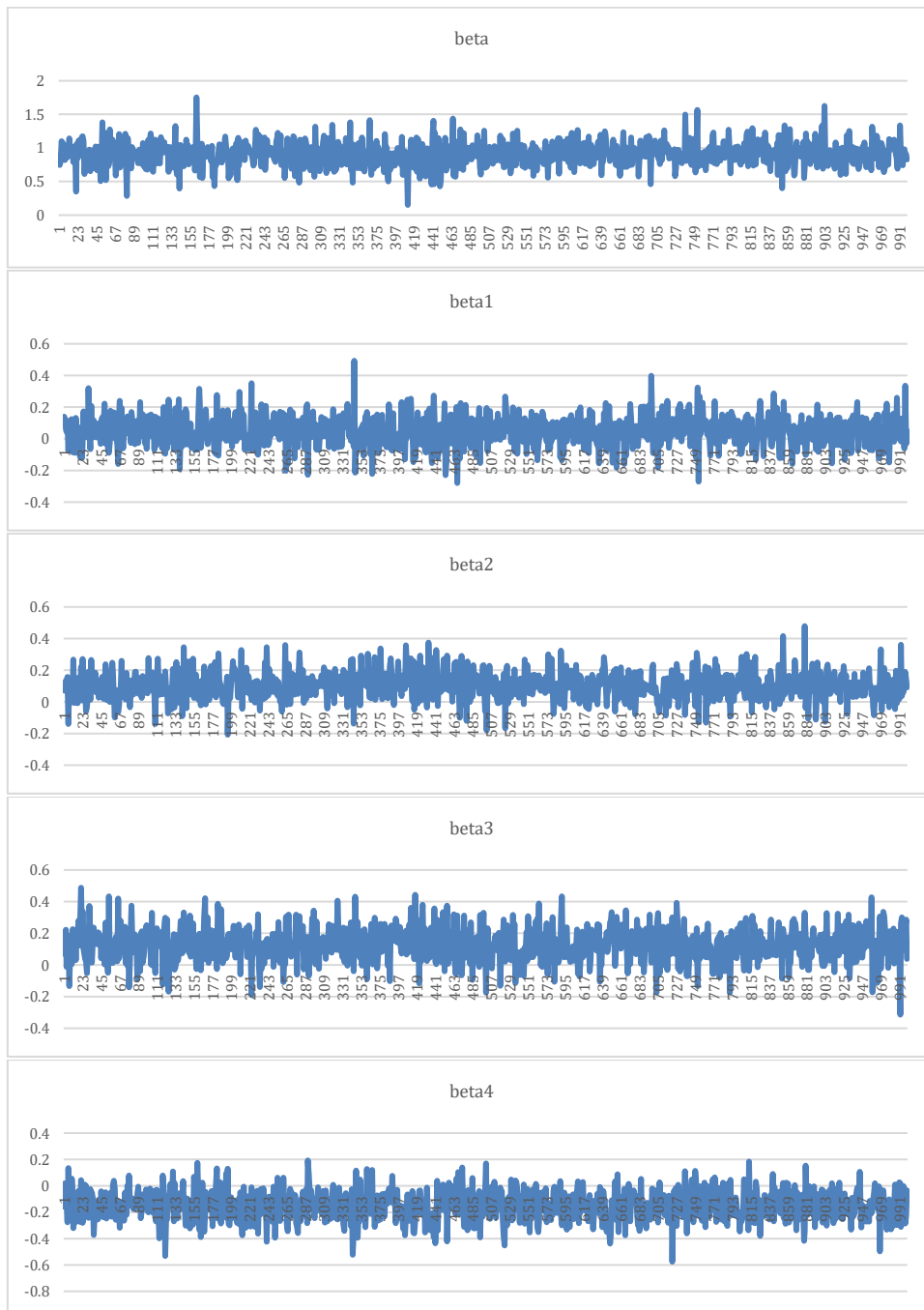
ecosystem, the proposed network is poised to champion and propagate the intrinsic value that internal auditors contribute to their respective organizations.

We again confirm the convergence of our MCMC sampling by examining the after-burn-in MCMC process. Fig. 2 shows that all parameters' estimations have convergent MCMC draws.

Table 3: Bayesian spatial regression model estimation

Constructs (variables)	Mean	Median	P2.5	P97.5
Constant	0.921	0.913	0.562	1.300
Competence of the IA department	0.154	0.157	0.032	0.233
IA independence	0.197	0.195	0.069	0.276
Management training ground	0.152	0.151	0.083	0.330
Management support for IA	-0.151	-0.149	-0.384	0.076
Interaction between internal and external audit	-0.099	-0.100	-0.302	0.114
Supportive control environment	0.032	0.032	-0.176	0.246
λ	0.201	0.199	0.121	0.285

P2.5 and P97.5 show 2.5% and 97.5% percentiles (which is a 95% credible interval)



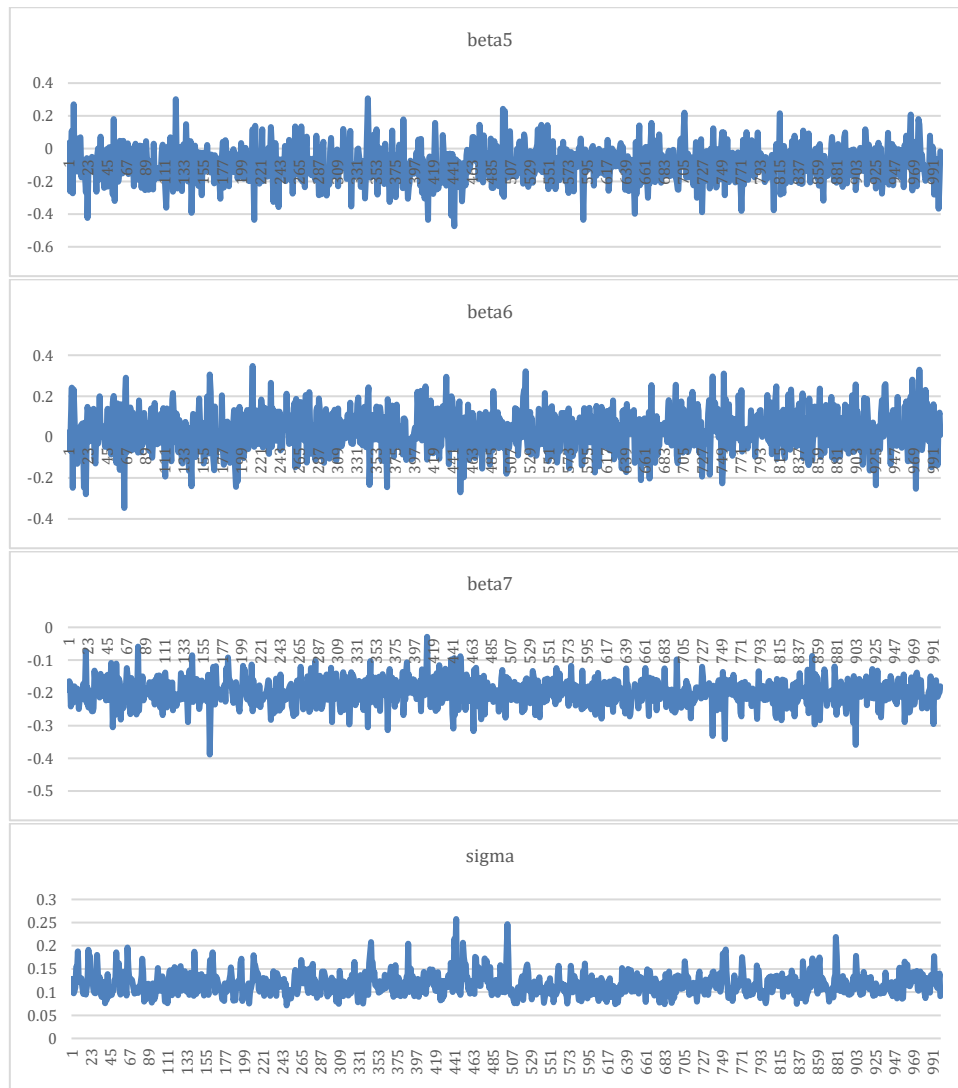


Fig. 2: MCMC estimation plot of the spatial regression; “beta” indicates MCMC draws of the constant; “beta1”-“beta6” are associated with X1-X6, respectively; “beta7” is the MCMC process of λ

5. Conclusions

In summation, this study has undertaken a comprehensive exploration of the determinants influencing the effectiveness of internal audit within the context of 24 commercial banks, each listed on the Vietnam Stock Exchange and the Upcom. Employing the Bayesian spatial regression model, recognized for its robust analytical capabilities in assessing the intricate interconnections and co-movements governing internal audit effectiveness among banks, our research has yielded several noteworthy findings of substantive significance.

Firstly, our investigation has substantiated the constructive influence of factors such as the "Competence of the IA Department," "IA Independence," and "Management Training Ground" on the efficacy of internal audit endeavors within the Vietnamese commercial banking sector. These factors have emerged as pivotal elements in fortifying the internal audit landscape, underscoring their role as catalysts for superior performance.

Moreover, our research has unearthed a phenomenon of profound relevance: the discernible presence of substantially positive inter-bank

spillover effects in relation to internal audit effectiveness. This revelation posits a compelling argument for a collective and collaborative approach among banks to elevate the quality of their internal audit practices. Initiatives such as the establishment of a joint internal audit association or the institution of collaborative training sessions for internal audit personnel emerge as practical measures to enhance the overall resilience and competitiveness of banks operating within the Vietnamese commercial banking domain.

In light of these findings, it is imperative for banks to proactively engage in cooperative endeavors, driven by the understanding that the optimization of internal audit effectiveness stands as a collective endeavor, poised to bolster the vitality and longevity of the banking sector in Vietnam. By aligning their efforts and sharing their knowledge and experiences, these institutions can collectively chart a course towards heightened effectiveness and sustained excellence in internal audit practices. This commitment to collaborative growth not only exemplifies prudent business strategy but also underscores the bank's commitment to the enduring value internal auditors bring to their organizations.

Compliance with ethical standards

Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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