



Université de Strasbourg
École Doctorale Augustin Cournot

Essay on Fiscal Policy, Public Debt, and Growth: Applications to Vietnam

presented for

Doctor of Philosophy in Economics

by

Duc Anh LE

January 13th, 2017

Jury

António AFONSO	Rapporteur externe	Professeur, Université de Lisbon
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1 Introduction générale

Les économistes savent, dans un certain sens, que la croissance économique est très importante, avec une forte préférence pour les théories économiques de Swan (1956), Solow (1956), Cass (1965), et Barro and Sala-i'-Martin (1995), etc. Les principales idées et contributions ont été résumées par Azariadis (1993), Barro and Sala-i'-Martin (1995), et Acemoglu (2008). Par exemple, Barro and Sala-i'-Martin (1995) a reconnu que les économistes classiques comme Smith (1776), Ricardo (1821), et Ramsey (1928) ont été à l'origine de fondements qui sont nécessaires pour les théories modernes de l'économie de la croissance, avec les équilibres dynamiques, le rôle des rendements d'échelle décroissants et la relation d'accumulation du capital physique, du capital humain, le taux de croissance de la population, les effets des changements technologiques en termes de production de nouveaux produits et de spécialisation du travail.

La question à laquelle les économistes tentent de répondre est celle portant sur les sources de la croissance économique dans le temps, ainsi que les causes des différences dans les performances économiques entre les pays (Acemoglu, 2008). Comme Barro and Sala-i'-Martin (1995) l'a mentionné, le point de départ des théories modernes de la croissance est l'article, devenu classique, de Ramsey (1928). Dans celui-ci, Ramsey étudie l'optimisation dans le temps faite par les ménages. Les contributions de Ramsey (1928) ont affecté de manière significative les théories de la consommation, de

l'évaluation des actifs financiers, et plus tard du cycle économique. De plus, l'étude de Ramsey (1928) portait sur l'utilisation d'une fonction d'utilité séparable, qui est largement utilisée aujourd'hui avec la fonction de production Cobb-Douglas. Plus tard, plusieurs économistes comme Harrod (1939) et Domar (1946) ont utilisé des fonctions de production avec peu de substituabilité entre les facteurs de production afin de débattre sur l'instabilité du système capitaliste. En dépit de l'adhésion de plusieurs économistes à ces idées à cette époque, ces analyses jouent un rôle mineur dans les réflexions d'aujourd'hui.

L'une des contributions la plus importante pour l'économie de la croissance est le modèle de Solow (1956) et de Swan (1956). Ce modèle est remarquable de par sa simplicité. Le modèle de Solow-Swan est composé de deux éléments, le travail et le capital, avec l'hypothèse que la production a des rendements constants, des rendements décroissants pour chaque facteur, ainsi qu'une élasticité positive et faible entre les facteurs (Barro, 2004). Le modèle de Solow-Swan a récemment été utilisé dans des études empiriques par plusieurs chercheurs pour observer la convergence conditionnelle du PIB par habitant dans le temps, et entre pays. Ces études ont montré que les différences entre les politiques des gouvernements et le stock initial de capital humain devraient être considérées comme des variables explicatives de la croissance économique entre les pays et les régions. Cependant, les économistes néoclassiques ont argumenté que le modèle de Solow-Swan ne tient pas compte du progrès technologique. En appliquant l'analyse de Ramsey (1928) portant sur l'optimisation par les consommateurs au modèle néoclassique de croissance, Cass (1965) a montré que le taux d'épargne est, sur l'unique trajectoire optimale, déterminé par l'investissement brut par habitant et par le stock marginal de capital. Au même moment, Koopmans et al. (1965) a obtenu la même condition que Ramsey (1928): à tout moment, l'utilité marginale de la consommation par habitant est égale au ratio de l'excédent net du niveau maximal d'utilité soutenable sur le niveau actuel d'utilité de l'augmentation nette en capital par travailleur. Il est difficile d'inclure le changement technologique dans le cadre néoclassique. Même si la théorie néoclassique de la croissance a largement contribué aux études économiques,

l'efficacité de cette théorie a été limitée du fait de l'absence d'applications empiriques à ce moment. Au contraire, les économistes ont continué à utiliser des modèles peu complexes techniquement, mais utiles d'un point de vue empirique. Comme l'a mentionné [Barro and Sala-i'-Martin \(1995\)](#), les macroéconomistes se sont principalement focalisés sur les fluctuations de court terme d'environ une quinzaine d'années. À cette époque, l'application en pratique des méthodes d'équilibre général à la théorie du cycle économique réel et aux politiques d'évaluation a largement été considérée.

Il semble que les études portant sur la croissance économique ont attiré de nombreux chercheurs, depuis les articles de [Romer \(1986\)](#) et [Lucas \(1988\)](#). Les modèles de croissance endogène ont été introduits avec plusieurs contributions afin de déterminer le taux de croissance à long terme ainsi que ses déterminants. Ces auteurs ont présenté des modèles de croissance de long terme dans les quels la technologie et le capital humain ont été considérés comme des facteurs dans la fonction de production. Avec les principaux facteurs de production, que sont le travail et le capital physique, [Romer \(1986\)](#) a postulé que la formation en entreprise ou l'apprentissage par la pratique apparaissent comme des facteurs importants dans la formation du capital humain et de la connaissance, comme une partie de la diffusion de la technologie a affecté de manière significative la productivité. Récemment, plusieurs aspects de l'économie (dépense budgétaire, taxation, productivité et d'autres éléments des politiques fiscales et monétaires) ont été considérés afin d'étudier leur relation avec la croissance économique. Une contribution remarquable dans ce domaine est celle de [Barro \(1990\)](#). L'auteur a développé un modèle dans lequel le gouvernement joue un rôle actif la croissance de long terme en distinguant les dépenses productives des dépenses totales du gouvernement. Il montre également que l'investissement public a un impact positif sur la croissance économique, alors que le ratio des dépenses du gouvernement sur le PIB est corrélé négativement avec la croissance économique. En développant le modèle de [Barro \(1990\)](#), [Devarajan et al. \(1996\)](#) ont considéré la relation entre chaque composantes des dépenses du gouvernement avec la croissance, et ont montré que la dépense courante du gouvernement est associée avec une plus grande croissance. Dans cette étude, certaines formes de dépenses productives

en capital, transport, communication, santé et éducation ont un impact négatif sur la croissance économique. Ces résultats de [Devarajan et al. \(1996\)](#) sont différents de ceux de [Mundle \(1999\)](#) et [Glomm and Ravikumar \(1997\)](#) qui ont établi que les dépenses dans les infrastructures et les services sociaux ont un impact significatif sur le taux de croissance à long terme. Les études empiriques ont mis en évidence des résultats différents. D'un côté, certains auteurs comme [Folster and Henrekson \(2001\)](#), [Lee \(1995\)](#), [Guseh \(1997\)](#), et [Conte and Darrat \(1988\)](#) ont montré qu'il y a une relation négative entre les dépenses du gouvernement et la croissance économique. D'un autre côté, [Grier and Tullock \(1989\)](#), [Gupta et al. \(2005\)](#) et [Alexiou \(2009\)](#) ont montré que les dépenses du gouvernement avaient un impact positif et significatif sur la croissance économique.

Dans un autre registre, plusieurs chercheurs ont étudié la relation existante entre la taxation et la croissance, tant d'un point de vue théorique qu'empirique. [Uhlig and Yanagawa \(1995\)](#) a développé un modèle à générations imbriquées avec croissance endogène, et a conclu qu'un taux de taxe plus élevé sur le revenu du capital permet une croissance plus rapide. [Scully and Fellow \(1991\)](#) a indiqué que lorsque le poids des taxes dans un pays ne dépasse pas 19.3% du PIB (en moyenne), alors la croissance économique est plus élevée. Cependant, si le taux de taxation est plus élevé (environ 45%), alors cela peut mener à une baisse de la croissance économique. [Padovano and Galli \(2001\)](#) a montré, en conduisant des simulations sur des données de 23 pays de l'OCDE entre 1951 et 1990, que le revenu marginal de la taxe a un impact négatif sur la croissance économique. Ces résultats sont similaires à ceux de [Mullen and Williams \(1994\)](#), alors que [Easterly and Rebelo \(1993\)](#) a supposé qu'il est difficile d'isoler les effets des politiques de taxation sur la croissance avec un échantillon de 63 pays développés et en développement. [Easterly and Rebelo \(1993\)](#) a aussi montré que les taux de taxes sur le revenu important pour les pays développés seulement. Une étude récente de [Ojede and Yamarik \(2012\)](#) a montré des résultats différents. Les auteurs ont établi que les taxes sur le revenu n'ont pas d'impact sur la croissance de court ou long terme, alors que les impôts fonciers ainsi que les taxes sur les ventes font baisser la croissance économique.

Dans les modèles de croissance endogène, non seulement les économistes prennent en compte les taxes qui servent à financer les dépenses de l'État, mais ils prennent également en compte d'autres éléments du budget du gouvernement, comme les emprunts sur les marchés afin de financer les dépenses, appelés dettes publiques. Greiner (2007) a fait l'hypothèse que le ratio du surplus primaire sur le revenu domestique brut est une fonction linéaire et positive du ratio de la dette sur la dette domestique brute. L'auteur a également établi qu'une trajectoire soutenable vers une croissance équilibrée existe si le gouvernement utilise une certaine partie des revenus des taxes pour les services de la dette. Reinhart and Rogoff (2010) a montré que, tant pour les pays développés que pour les pays en développement, un ratio élevé de la dette publique sur le PIB (90% et plus) est associé à un taux de croissance de l'économie plus faible. Dans une autre étude, Herndon et al. (2014) a nuancé les conclusions de Reinhart and Rogoff (2010) car il y avait des erreurs dans la récolte des données, et a réfuté que des ratios de la dette publique sur le PIB supérieurs à 90% réduisent constamment la croissance du PIB d'un pays. Clements et al. (2003) a indiqué que des hauts niveaux de dette publique peuvent conduire à des baisses de la croissance économique dans les pays à faible revenu. Clements et al. (2003) a également établi que la dette publique a des effets néfastes sur la croissance si le ratio de la dette publique sur le PIB est supérieur à 50% pour la valeur nominale de la dette externe, et à environ 20-25% pour sa valeur présente nette estimée. En réalité, certains pays ont régulé le seuil de la dette publique par rapport au PIB différemment. Par exemple, le seuil de la dette publique dans les pays européens n'excède pas 60% du PIB, et alors que ce chiffre remonte à 65% du PIB dans le cas du Vietnam.

En dépit d'une vaste littérature portant sur la croissance endogène, presque toutes les études ont traité la dette publique comme une dette domestique. Ce qui motive cette thèse est que, si la dette publique est distinguée par deux types de dettes, la dette externe et la dette domestique (ou dette interne), alors quelle est la relation entre les dépenses du gouvernement, les dettes externe et domestique, et la croissance économique ? Dans ce cas, quel est l'effet du taux de taxation sur l'économie ? L'objectif

de cette thèse est d'étudier cette relation. De plus, cette thèse explore également les impacts des dépenses du gouvernement sur la productivité totale des facteurs entre les provinces, ainsi que les effets de la décentralisation des dépenses du gouvernement sur la croissance économique dans le cas du Vietnam.

Organisation de la thèse et contributions

A partir de cette problématique, cette thèse se concentre sur l'investigation de la relation entre certains composantes de la politique fiscale et la croissance économique, en développant un modèle avec l'hypothèse qu'il y a deux types de dette publique: la dette externe et la dette domestique. Cette thèse étudie également les impacts des dépenses de gouvernement sur la croissance et la productivité totale des facteurs entre les provinces du Vietnam. Cette thèse considère également le cas de la décentralisation des dépenses du gouvernement au Vietnam. À l'exception de l'introduction générale et de la conclusion, cette thèse se structure autour des 4 chapitres suivants:

Le **Chapitre 3** propose un aperçu de l'économie du Vietnam. Ce chapitre résume le contexte économique du Vietnam en termes de croissance économique, de réformes du système fiscal, et de la décentralisation des dépenses du gouvernement, afin de fournir une image complète de l'économie du Vietnam au cours des dernières décennies. Par exemple, le taux de croissance annuel moyen pour la période 1991-2000 a été d'environ 7.56%, et il a été d'environ 7.26% pour la période 2001-2010. Sur la période étudiée, le Vietnam a réussi à contrôler l'inflation et à réduire la pauvreté. Par ailleurs, le système fiscal du Vietnam a été réformé pour répondre à un enjeu de développement économique (Martinez-Vazquez and McNab, 2000), en particulier le rôle des entreprises a été souligné par les contributions à travers les taxes au budget de l'état (Quang and Dung, 1997; Chan and Whalley, 1999; et Hoang-Anh, 2007). Ce chapitre donne également quelques informations sur la décentralisation des dépenses du gouvernement et de la dette publique du Vietnam.

Le **Chapitre 4** présente la relation entre les dépenses du gouvernement, les dettes

externe et domestique, et la croissance économique. Dans ce chapitre, nous développons les modèles de Barro (1990) et Greiner (2007), en distinguant la dépense du gouvernement en deux types: les dettes externe et domestique. De plus, nous faisons l'hypothèse qu'il y a uniquement une taxe uniforme dans l'économie, et supposons que le ratio de l'excédent primaire sur le produit intérieur brut est une fonction linéaire de la dette, ce qui assure que la dette publique est soutenable. Ce chapitre analyse également le comportement de l'économie et examine l'impact du taux de taxation sur les actifs de l'économie, à l'aide d'une analyse dynamique. Les contributions de cette thèse sont les suivantes: les dépenses du gouvernement, la consommation, et la dette publique augmentent avec les taxes sur les rendements des actifs. Cependant, si la productivité du capital physique est faible, ou si le ratio de la dette est élevé, alors l'effet de la taxation est négatif. Dans le cas d'une productivité du capital physique élevé, l'impact de la taxation sur la dette externe est positif si le taux de taxation ne dépasse pas un certain seuil. Le cas échéant, la relation est décroissante.

Ce chapitre est co-écrit avec Phu NGUYEN-VAN, Cuong LE VAN, et Amélie BARBIER-GAUCHARD et présenté dans les séminaires 64^{ème} édition de l'AFSE (Rennes), 15^{ème} édition du PET (Luxembourg). Il a été publié comme document de travail du BETA (No. 2015-25) et soumis au *Journal of Public Economics Theory* pour publication.

Dans le **Chapitre 5**, nous cherchons à déterminer si les dynamiques des dépenses locales et nationales au Vietnam peuvent avoir un impact sur les économies locales, en termes de croissance et de productivité. Un deuxième objectif consiste à étudier les différences entre les provinces du Vietnam en termes de productivité. Une telle étude n'a pas encore été menée à ce jour, probablement du fait d'une absence de données fiables. Nous analysons l'impact des dépenses publiques sur la productivité des provinces vietnamiennes en distinguant deux types de dépenses publiques, aux niveaux national et provincial. Nous estimons le rôle des dépenses publiques à ces deux niveaux sur le processus de production, en utilisant des données provenant de 58 provinces vietnami-

ennes recueillies sur la période 2000-2007. Nous proposons une modélisation structurelle en estimant une fonction de production stochastique pour les provinces vietnamiennes. Notre modèle présente l'intérêt d'adapter l'approche au niveau de la firme initiée par [Pakes and Olley \(1995\)](#), [Levinsohn and Petrin \(2003\)](#), et [Akerberg et al. \(2006\)](#), à nos données régionales. Notre deuxième apport est que notre modèle distingue clairement trois composants de la Productivité Totale des Facteurs (PTF): (i) un changement technologique autonome; (ii) un changement technologique déterministe qui dépend de facteurs externes au niveau de la province, comme le capital humain et la structure de l'économie locale (part des services, de l'industrie, et de l'agriculture dans le PIB régional); et (iii) un changement technologique (stochastique) non observable. De plus, à partir de l'estimation de la fonction de production, nous calculons la PTF des provinces vietnamiennes, et examinons sa dynamique afin de déterminer la distribution sur le long terme de la PTF entre les 58 provinces vietnamiennes. Enfin, nos résultats sont validés par le fait que nous prenons en compte le problème d'endogénéité pouvant être causé par des erreurs de mesure des variables.

Nous pouvons résumer les principaux résultats comme suit. Premièrement, parmi les facteurs de production provinciaux (capital physique, force de travail et dépense publique), seule la force de travail a un effet positif et significatif sur la croissance des produits des provinces vietnamiennes. Les dépenses locales et nationales n'ont pas d'effet significatif sur la productivité. Deuxièmement, nos résultats montrent que la part de l'agriculture et des services dans le PIB provincial a un effet négatif et significatif sur la productivité des provinces vietnamiennes, alors que le taux d'alphabétisation (qui permet d'approcher le capital humain) a un effet positif et significatif. Ces résultats signifient que les facteurs externes peuvent expliquer les différences entre les provinces en termes de PTF et de revenu. Enfin, en analysant la dynamique des PTF, nous ne trouvons pas de preuve de l'existence d'une convergence entre les 58 provinces vietnamiennes. La distribution de long terme de la PTF semble suivre un modèle divergeant, correspondant à un phénomène de bipolarisation selon lequel les provinces sont classées en deux groupes: un premier groupe avec des hauts niveaux de PTF, et un second

avec des niveaux faibles de PTF. Cette caractéristique bipolaire peut conduire à une explication possible de la disparité décrite plus haut concernant la compétition entre les provinces vietnamiennes.

Ce chapitre a donné lieu à un papier co-écrit avec Phu NGUYEN VAN et Kim Cuong PHAM THI. Ce travail a été présenté dans les séminaires et à la 65^{ème} édition de l'AFSE (Nancy). Ce chapitre est disponible en document de travail du BETA (No. 2016-17).

Le **Chapitre 6** examine la relation entre la décentralisation des dépenses du gouvernement et la croissance économique des provinces vietnamiennes sur la période 2000-2007. En développant le modèle de [Devarajan et al. \(1996\)](#), les dépenses provinciales totales du gouvernement financées par les taxes sur le revenu des provinces, consistent en deux types de dépenses: les dépenses des gouvernements locaux, et les dépenses du gouvernement central dans les provinces. Dans cette étude, les dépenses provinciales totales du gouvernement sont supposées être principalement dépensées durant l'année fiscale, et il n'y a pas de transfert budgétaire pour financer d'autres domaines, ou un autre niveau. Nous faisons également l'hypothèse que la décentralisation fiscale, mesurée par le ratio des dépenses gouvernementales locales sur les dépenses totales locales et centrales de gouvernement dans les provinces. Nous étudions le sentier de croissance équilibré afin de déterminer l'impact du taux de taxation et de la décentralisation des dépenses du gouvernement sur le taux de croissance de l'économie. De plus, nous appliquons le modèle aux données Vietnamiennes. Les principaux résultats peuvent être résumés comme suit. Premièrement, si le taux de taxation est suffisamment faible par rapport au seuil du taux de taxe déterminé par la productivité des dépenses du gouvernement, une augmentation du taux de taxe conduira à une augmentation de la croissance. Si le taux de taxation est suffisamment élevé, une augmentation du taux de taxation peut être désastreux pour la croissance. Deuxièmement, la décentralisation des dépenses du gouvernement favorisera la croissance économique si la part des dépenses du gouvernement local est suffisamment faible par rapport à celle déterminée par le

ratio entre l'élasticité des dépenses du gouvernement local d'une part, et la somme des élasticité des gouvernements locaux et centraux, d'autre part. Enfin, l'estimation des résultats confirme que la décentralisation des dépenses du gouvernement dans le cas du Vietnam a un impact positif sur la croissance économique: plus les dépenses du gouvernement sont décentralisées, plus grande sera la croissance économique.

2 General introduction

2.1 Motivation

Economists have, in some sense, known that economic growth is very important with the key preferences on the theories of economic growth are [Swan \(1956\)](#), [Solow \(1956\)](#), [Cass \(1965\)](#), and [Barro and Sala-i'-Martin \(1995\)](#), etc. The main ideas and contributions have been summarized by [Azariadis \(1993\)](#), [Barro and Sala-i'-Martin \(1995\)](#), and [Acemoglu \(2008\)](#). For instance, [Barro and Sala-i'-Martin \(1995\)](#) recognized that classical economists such as [Smith \(1776\)](#), [Ricardo \(1821\)](#), and [Ramsey \(1928\)](#) provided many basic elements that useful for modern theories of economic growth, include equilibrium dynamics, the role of diminishing return to scale and relation to accumulation of physical capital, human capital, growth rate of population, the effects of technological changes in terms of producing new products and specialization of labor.

The question economists concerned is the sources of economic growth over time and causes of differences in economic performance across countries ([Acemoglu, 2008](#)). As [Barro and Sala-i'-Martin \(1995\)](#) mentioned, the initial point for modern growth theory is the classical article of [Ramsey \(1928\)](#) in which the author studied about household optimization over time. Contributions of [Ramsey \(1928\)](#) is significant affected to consumption theory, asset pricing, and business cycle theory later. Furthermore, the study

of Ramsey (1928) concentrated on separable utility function which is used popularly today as the Cobb-Douglas production function. Later, some economists such as Harrod (1939) and Domar (1946) used production function with little substitutability upon the inputs to debate that the capitalist system is unstable. Even though those opinions had been agreed by many economists at that time but these analyses play a minor role in today's thinking.

One of the most important contribution to economic growth is the model of Solow (1956) and Swan (1956). This model is remarkable in its simplicity. The model of Solow-Swan composed two main elements, labor and capital, with the assumption that production is constant return to scale, diminishing returns to each input, and positive and smooth elasticity of substitution between inputs (Barro, 2004). The model of Solow-Swan has been exploited as empirical studies by many researches recently to investigate the conditional convergence of GDP per capita over time and across-countries. Empirical studies implied that the differences between government's policies and initial stock of human capital should be considered as explanatory variables for economic growth across countries and regions. However, the neoclassical economists argued that the Solow - Swan model is deficiency of improvement in technology which is outside of the model. By applying Ramsey (1928) analysis of consumer optimization to neoclassical growth model, Cass (1965) showed that the saving rate is, on the unique optimum path, determined by gross investment per capita and marginal stock of capital. Simultaneously, Koopmans et al. (1965) provided the same condition with Ramsey (1928) that at any time the marginal utility of consumption per capita equals the ratio of the net excess of the maximum sustainable utility level over the net current utility level to the net increase in capital per worker. It is too hard to include the technological change in the neoclassical framework because the competitive assumption can not maintained. Even though the neoclassical theory of growth had great contributions in economic studies, the effectiveness of theory was limited because of its lack of empirical applications at that time. Contrarily, economists continued to apply the models that were not complexity of technique but empirically useful. As Barro and

[Sala-i-Martin \(1995\)](#) mentioned, macroeconomists concentrated almost of their attention on short-term fluctuation for about 15 years. At that time, the application of general equilibrium methods to real business cycle theory and policy evaluation were considered deeply.

It seems to be that studies of economic growth attracted researchers from articles of [Romer \(1986\)](#) and [Lucas \(1988\)](#). The endogenous growth models were introduced with many contributions to determine the long-run growth rate and its determinants. These authors presented the model of long-run growth in which technology and knowledge have been addressed as inputs in production. Along with main factors of production function, labor and physical capital, [Romer \(1986\)](#) postulated that on-the-job-training or learning-by-doing appear to be an important factor in the formation of human capital and knowledge as apart of the diffusion of technology that is significant affected productivity. Recently, many aspects of economy have been placed in order to investigate the relationship with economic growth such government expenditure, taxation, productivity, and other components of fiscal policy and monetary policy. A remarkable contribution in this area is the work of [Barro \(1990\)](#). The author developed the model in which a government plays active role in long-run growth by distinguishing productive spending upon total government spending. He also found that public investment has a positive impact on economic growth meanwhile the ratio of government spending to GDP is negatively correlated to economic growth. By developing the model of [Barro \(1990\)](#), [Devarajan et al. \(1996\)](#) considered the relationship between each components of government spending with growth and showed that current spending of government is associated with a higher growth. In this research, some kinds of productive spending on capital, transport, communication, health and education have a negative impact on economic growth. These findings of [Devarajan et al. \(1996\)](#) are different with findings of [Mundle \(1999\)](#) and [Glomm and Ravikumar \(1997\)](#) who stated that spendings in infrastructure and social services have a significant impact on the long-run growth rate. Empirical evidences showed different results. On the one hand, some authors provided the negative relationship between government spending and economic growth,

for instance, Folster and Henrekson (2001), Lee (1995), Guseh (1997), and Conte and Darrat (1988). On the other hand, Grier and Tullock (1989), Gupta et al. (2005) and Alexiou (2009) stated that government spending have a positive and significant effect on economic growth.

In other aspect, many scientists have concerned about the relationship between taxation and growth in both theoretical and empirical researches. Uhlig and Yanagawa (1995) developed the model for overlapping generations economies with endogenous growth and concluded that a higher capital income tax rate leads to faster growth in two-period overlapping generations model. For example, Scully and Fellow (1991) indicated that countries take no more than 19.3% percent of gross domestic product in taxes (on the average) will promote economic growth. However, if the tax rate is higher (about 45%) that leads to decrease economic growth. Padovano and Galli (2001) argued that the marginal income tax rate has a negative impact on economic growth by doing estimation on data of 23 OECD countries from 1951 to 1990, the finding is similar to Mullen and Williams (1994) meanwhile Easterly and Rebelo (1993) supposed that it is difficult to isolate the effects of tax policy on growth with the sample of 63 developed and developing countries. Easterly and Rebelo (1993) also stated that income tax rate is only important in developed countries. A recently study by Ojede and Yamarik (2012) showed a different results. The author stated that the income tax has no impact even on short-run and long-run growth meanwhile property taxes and sales taxes reduce economic growth.

In endogenous growth, economists not only concerned about the taxes which financed the government expenditure, they also considered about other components of government budget, borrowing from market for financing its expenditure that called public debt. Greiner (2007) assumed that the ratio of primary surplus to gross domestic income is a positive linear function of the debt to gross domestic debt ratio. The author also stated that a sustainable balanced growth path exists if the government uses a certain part of the tax revenue for the debt services. Reinhart and Rogoff (2010) stated that both developed and developing countries, a high ratio of public debt to GDP

(90% and above) is associated with lower growth rate of economy. In other research, [Herndon et al. \(2014\)](#) argued the findings of [Reinhart and Rogoff \(2010\)](#) because the mistake of data collection and refuted that the ratio of public debt to GDP higher than 90% consistently reduces a country's GDP growth. [Clements et al. \(2003\)](#) indicated that high levels of public debt can lead to reduce economic growth in low-income countries. [Clements et al. \(2003\)](#) also stated that public debt has a harmful effect on growth if the ratio of public debt to GDP is over 50% for the face value of external debt, and at about 20-25% for its estimated net present value. In reality, some countries regulated threshold of public debt to GDP differently, for instance, the threshold of public debt in European countries is not over 60% of GDP and 65% of GDP in case of Vietnam.

Despite a vast of literature in endogenous growth, almost of all studies concerned about public debt as external debt. What motivates us that if public debt is distinguished by two types, external debt and domestic debt (internal debt) then how is about the relationship between government expenditure, external and domestic debt, and economic growth? In this case, what is the effect of tax rate on economy? This thesis aims to study about this relation. Furthermore, this thesis also examines the impacts of government expenditure on total factor productivity across provinces and effects of government expenditure decentralization on economic growth in case of Vietnam.

2.2 Overview of thesis and contributions

With the purposes of study, the thesis concentrates on investigating the relationship between some components of fiscal policy and economic growth by developing the economic model with assumption that there are two kinds of public debt, external debt and domestic debt. Moreover, for a certain case of study, the thesis also examines the impacts of government expenditure on growth and total factor productivity across Vietnam's provinces. The thesis shows the evidence of decentralization in government expenditure and economic growth in case of Vietnam too. With the exception of general introduction and conclusion parts, the thesis is structured as 4 main following chapters:

Chapter 3 introduces an overview of Vietnam's economy. This chapter summarizes Vietnam's economy context in terms of economic growth, taxation system reforms, and decentralization in public expenditure in order to provide a full picture of Vietnam's economy for some recent decades. For instance, average annual growth rate for period 1991-2000 was about 7.56% and it was about 7.26% for period 2001-2010. Hence, Vietnam had great achievements in poverty reduction and inflation control. On the other side, taxation system of Vietnam has been reformed as economic development inquiry (Martinez-Vazquez and McNab, 2000), especially the role of enterprises is underlined by taxes contribution to the State budget (Quang and Dung, 1997; Chan and Whalley, 1999; and Hoang-Anh, 2007). This chapter also provides some information about decentralization in Vietnam's government expenditure and public debt in brief.

Chapter 4 will present the relationship between government expenditure, external and domestic debt, and economic growth. In this chapter, we develop the model of Barro (1990) and Greiner (2007) in which government expenditure is distinguished by two types, external and domestic debt. Moreover, we assume that there is only flat tax rate in economy and ratio of the primary surplus to gross domestic income is a linear function of the debt which assures that public debt is sustainable. The chapter also analyzes the behavior of economy and examines the impact of tax rate on asset on economy by studying the balanced growth path. The contributions of this chapter can summarize following: government expenditure, consumption, and domestic debt increase with tax on asset return, however, if the productivity of physical capital is small or the ratio of debt is large, the effect of taxation is negative. In case of high productivity of physical capital, the impact of taxation on external debt is positive if the tax rate does not exceed a certain threshold, otherwise, the relation is decreasing.

This chapter has circulated as a paper co-written with Phu NGUYEN-VAN, Cuong LE VAN, and Amélie BARBIER-GAUCHARD. The paper was presented at the conference AFSE 2015 (Rennes, France), the conference of Public Economics Theory Association 15 (Luxembourg, 2015), it was a working paper No.2015-25 (BETA, University of Strasbourg), and submitted to the Journal of Public Economics Theory for publication.

Chapter 5 aims to investigate whether the underlying dynamics of local and national public expenditure in Vietnam can have any impacts on the local economies, in terms of growth and productivity. Another objective is to assess the difference among Vietnam's provinces in terms of their productivity. Such a study has not been done so far, probably due to the lack of reliable data. We investigate the impact of public expenditure on productivity of Vietnam's provinces by distinguishing two types of public expenditure at the national and the provincial levels. We estimate the role of provincial and national public expenditure in the production process using a data set of 58 Vietnam's provinces over period 2000-2007. We propose a structural modeling to estimate a stochastic production function for these Vietnam's provinces. Our model has an interesting feature which consists of adapting the firm-level approach initiated by [Pakes and Olley \(1995\)](#), [Levinsohn and Petrin \(2003\)](#), and [Akerberg et al. \(2006\)](#) to regional data. A second novel feature is that our model clearly distinguishes three components of TFP: (i) an autonomous technological change, (ii) a deterministic technological change depending on provincial external factors such as human capital and local economy's structure (shares of services, industry, and agriculture in the regional GDP), and (iii) an unobservable (stochastic) technological change. Furthermore, based on the production function estimation, we compute the TFP of Vietnam's provinces and examine its dynamics in order to investigate the long-run distribution of TFP across 58 Vietnam's provinces. Finally, our results are checked by taking into account the endogeneity problem which may be caused by measurement errors in variables.

The main results may be summarized as follows. First, among provincial inputs (physical capital, labor force and public expenditure), only labor force has a positive and significant effect on the output growth of Vietnam's provinces. Neither national nor local public expenditure has a significant effect on productivity. Second, our results show that the share of agriculture and that of services in provincial GDP have negative and significant effects on the productivity of Vietnam's provinces whereas the literacy rate (which is a proxy for human capital) has a positive and significant effect. This finding means that these external factors can explain the cross-provincial differences in

terms of TFP and income. Finally, when analyzing the dynamics of TFP, we do not find any evidence of convergence between 58 Vietnam's provinces. The long-run distribution of TFP displays a divergence pattern corresponding to a bipolarization phenomenon where provinces are amassed into two groups, one with high TFP levels and another with low TFP levels. This bipolar feature provides a plausible explanation of the disparity described above regarding the competition between the Vietnam's provinces.

This chapter has circulated as a paper co-written with Phu NGUYEN VAN and Kim Cuong PHAM THI. This paper was presented at AFSE 16 (Nancy 2016, France) and a working paper No.2016-17 (BETA, University of Strasbourg).

Chapter 6 examines the relationship between decentralization in government expenditure and economic growth across Vietnam's provinces in the period 2000-2007. By developing the model of [Devarajan et al. \(1996\)](#), total provincial government expenditure financed by tax collection on provincial output, consists of two types, local government expenditure and central government expenditure in that province. In this study, total provincial government expenditure is assumed to be consumed entirely in the fiscal year and there is no budget transfer to another purposes or another levels of government. We also assume that fiscal decentralization is measured by the ratio of local government expenditure to total government expenditure in provinces. We study the balanced growth path in order to investigate the impact of tax rate and government expenditure decentralization on growth rate of economy. Moreover, we apply the model to Vietnamese data. The main findings can be summarized as follows: the tax rate and provincial economic growth have the bell-shape form relation, so does the level of decentralization in government expenditure. For the case of Vietnam's provinces in the period 2000-2007, the estimation results indicate that a higher level of decentralization in government expenditure leads to a higher economic growth.

3 From Centrally-planned to Market Economy: Vietnam as a new Tiger

3.1 Introduction

Vietnam, a country in South East Asia, has a long history in defending national territory over centuries and currently has impressive achievements in economic development. For instance, economic growth rate was about 7% per year in the period 2000-2005, and round 6.5% for period 2006-2010 (see Office, 2015). Before 1975, Vietnam had been divided into two regions, North of Vietnam was under the control of Vietnam republic democracy government, and South of Vietnam was belongs to Republic of Vietnam. At that time, each side persuaded a different strategy in economic development in order to serve the united country. North of Vietnamese government implemented central planned economy in which government controls every economic activities. Meanwhile South of Vietnam seemed to operate the market economy that is alike American economy. However, as a results of war destroy, we only focus on overview and analyze Vietnamese economy regarding North of Vietnam. From April 1975, two sides of Viet-

nam has become unity and implemented economic policies as a whole. After 11 years implemented centrally-planned economy, Vietnam was far behind in economic development in comparison with other countries in Asia and the government faces renovation forces. In 1986, Vietnam had a very important decision in which economic scheme had renovated by applying market economic rules and social republic oriented. In the earlier of that time, Vietnam changed the monetary system that promoted a hyper - inflation (inflation rate recorded at 774.7% in 1986, see Report, 2015).

Some years later, Vietnam's economy had great achievements such as, the growth rate of economy rose 7% on average for the period of 1992 to 2000, inflation rate had been controlled. Furthermore, Vietnam became a member of ASEAN in 1995 (Association of Southeast Asia Nations) and normalized the relationship with the US in 1994. In general, Vietnam's economy had a very impressive growth in 1990s. To continue integration, Vietnam has become a member of World Trade Organization from November 1st, 2007 and has obtained many agreements of free trade with European Union, Japan, Korea, etc.

This chapter will summarize Vietnam's economy with regards to economic growth, taxation system reforms, and decentralization in public spending in order to provide overall Vietnam's economy context from 1975 to current time. First, Vietnam's economy from a low income to a middle income countries in terms of economic growth, inflation, and poverty reduction will be presented. Next, the role of taxation system reforms on economic development will be introduced. Finally, decentralization in public expenditure in Vietnam with its achievements and challenges will be reviewed.

3.2 Growth, inflation and poverty: From a low - income to a middle - income country

Before 1975, both North and South of Vietnam focused on production which served the wars. In general, Vietnam's economy was a very poor and the basic model of economic growth was fixed to Soviet's model (see Thang, 2001 and Dollar, 1994). Generally

speaking, on the one hand, North's economy implemented the Soviet's command economy in which private economic activities were forbidden, state allocated all national resources for production from input to output of economy as it had been in China. Distribution was followed the stamp system. On the other hand, the Southern government implemented the scheme which is similar to a market economy by American military supported. Industrial development was carried on via import substitution and consumers could buy products and services without stamps as it was been in North. Especially, farmers could sell their agricultural products for their benefits (see McCarty, 2001).

3.2.1 Economic growth

After obtaining national unity, Vietnam fulfilled the policy for whole which continued centrally-planned economy. With the first 5 years economic development plan 1976-1980, Vietnam concentrated on developing heavy industry then agriculture, however it failed. According to the report of Bureau of Communist Party in 1981, they stated that Vietnam's economy has many huge problems such as very low productivity, lack of input for manufactures, a giant mistake in distribution channel, a weak infrastructure, and so on. The contribution of each sector to economy is limited, hereafter, the graph describes the trend and results:

Within 10 years from 1991 - 2000, Vietnam's economy had great achievements (see Table 3.1). For instance, average GDP growth rate was 7.56% per year and absolute value of GDP in 2000 was increased 2.07 times in comparison with absolute value of GDP in 1991. Hence, growth rates of agriculture, industry, and services increased impressive. Average growth rates of agriculture, industry, and services were 4.2%, 11.3%, and 7.2% per year.

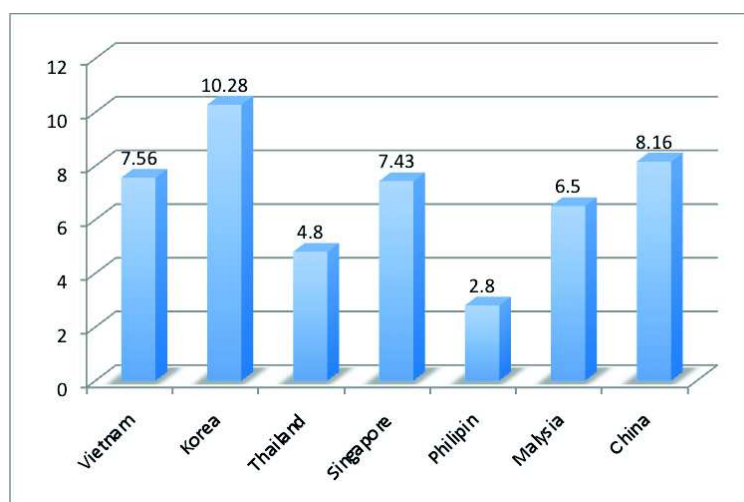
In comparison with other countries, the growth rate of Vietnam's economy was one of the most highest growth rate in the world. In the same period, average annual growth rate of Korea was 10.28%, Singapore 7.43%, Malaysia 6.5%, Thai Lan 4.8%, Philipine 2.8%, and China 8.16% (as shown in Figure 3.1)

Table 3.1: Average annual growth rate of GDP for the period 1991 - 2000 (%/year)

Time	GDP	Agriculture	Industry	Services
Average annual growth rate for period 1991 - 2000	7.56	4.2	11.3	7.2
1991 - 1995	8.18	4.09	12	8.6
1996 - 2000	6.94	4.3	10.6	5.75

Source: General Statistic Office, 2000.

Figure 3.1: Growth rate of economy in comparison for the period 1990 - 2000.



Source: General Statistic Office, 2000.

Although having the high growth rate of economy, Vietnam faced to many problems that might impact on economic activities. Montes (1995) stated that public sector comprised public enterprises and government agencies claimed almost of all state revenue, specially in current expenditure while expenditure on infrastructure and investment had not been used effectively. Furthermore, private sector did meet some difficulties for their business such as international trade procedure, able to approach loans, or illegal fees (see Riedel, 1997 and Dam, 1993). Despite the role of private sector determined in Constitution 1992 but private sector is lack of incentive as Communist Party's Policy, specially for small and medium enterprises (see Dutt et al, 2004) in reality.

"Article 15. The state develops a multi-sectoral commodity economy driven by the state-regulated market mechanism with socialist - oriented, based on ownership by the entire citizen along with collective and private ownership in which the first two are foundation stones."

Dollar (2002) stated that for the period 1990 - 2000, Vietnam starts a great economic reform for strengthening economic growth. However, author indicated there are some disadvantages for growth sustainability, for instance, the level of institution and legal framework are so poor in comparison with other emerging countries, weaknesses of protection right and efficient market's regulations that negatively impacts on investment.

In terms of structure's economy changes, there was a significant changes in proportion of GDP between agriculture, industry, and services sectors (as shown in Table 3.7). On the one hand, the proportion of agriculture in GDP decreased from 38.8% in 1990 to 24.3% in 2000. On the other hand, the proportion of industry and services increased from 22.7% in 1990 to 36.6% in 2000 and from 38.6% in 1990 to 39.1% GDP in 2000, respectively.

An explanation of these changes that Vietnam decided to pursue market economy oriented socialist based on developing multi-sectors of economy in which public enterprises take a leading role from 1986 and the new policies to adopt this strategy take time for efficiency. Some new laws enacted such as Law of land (1993) in which defines the

Table 3.2: Contributions of economics to GDP from 1990 - 2000 (% of GDP)

Time	Total	Agriculture	Industry	Services
1990	100	38.7	22.7	38.6
1995	100	27.2	28.8	44.0
2000	100	24.3	36.6	39.1

Source: General Statistic Office, 2000.

right of firms and household used and transferred the land, extends the land use right for farmers up to 50 years that encourages for long term investment, Law on private enterprise and Law on company were validated. Moreover, Vietnam became a member of ASEAN, participated into CEPT, and normalized relationship with the United States of America in 1995 that creates a huge foreign investment flow from another countries. The total foreign investment for the period 1996-2000 accounted for 11.035 billion USD, nearly doubled in comparison with the previous stage. Besides, according to General Statistic Office, Vietnam and European Union had a cooperated agreement in economic, trade, and science - technology in 1995, Vietnam also became a member of APEC (Asia-Pacific Economic Cooperation) in the same year. Until 2000, Vietnam had 170 trade agreements with other countries, over triple times in comparison with trade agreements in 1990. Moreover, when the Consultative Group Meeting between the Government of Vietnam and Development Partners has been restarted from 1993, partners of Vietnam committed to provide up to 17.5 billion USD via ODA (Official Development Assistance) and 1.2 billion USD through economic reforms. Obviously, these external resources help Vietnam very much in economic development.

To compare with previous stage, the growth of economy in the period 2001 - 2010 remained high growth rates even at that time the dimension of economy was larger than before. The average annual growth rate for this period was about 7.26%, a little bit lower than average annual growth rate in previous stage (7.56%), it was higher than economic growth of Thailand, Singapore, Philippine, Korea, and lower than growth rates of China and India at the same time. Despite the impact of financial crisis in

2008, Vietnam's economy remained the impressive growth (more detail in Table 3.3). For instance, growth of economy was 6.31% in 2008, 5.32% in 2009, and 6.78% in 2010. On the one hand, the average annual growth rates of sectors indicated the trend of economy's structure. In this period, growth rates of agriculture and industry sector decreased slowly from 4.2% per year in the period 1991 - 2000 to 3.58% per year in the period 2001 - 2010 in terms of agriculture, and from 11.3% per year in the period 1991 - 2000 to 9.09% per year in the period 2001 - 2010 with regard to industry sector. Meanwhile, the growth rate of services increased slightly, from 7.2% per year in the period 1991 - 2000 to 7.35% per year in the period 2001 - 2010. On the other hand, the ratio of each economic sector to GDP did not approach the targets that were determined in "*Social - economic development strategy for period 2001 - 2010*" published by government in which ratio of agriculture sector to GDP was around 16 - 17%, ratio of services sector to GDP was about 42 - 43%.

Table 3.3: Average annual growth rate of GDP by sectors from 2001 - 2010 (%/year)

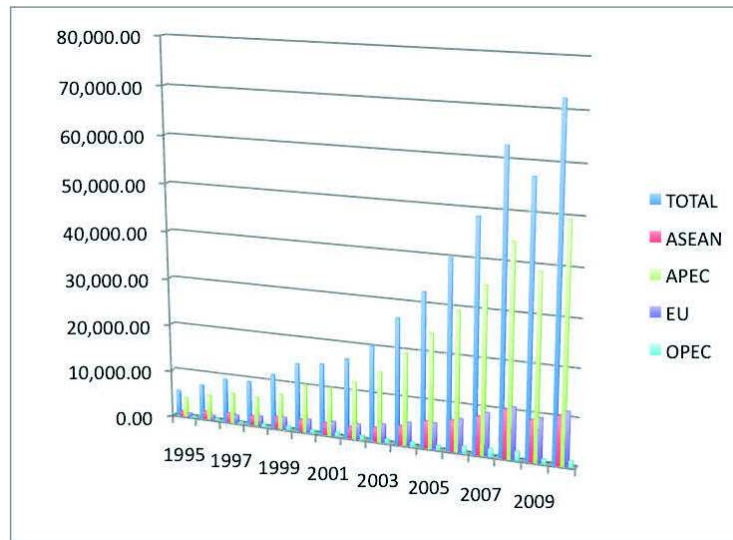
Time	GDP	Agriculture	Industry	Services
Average annual growth rate for period 1991 - 2000	7.56	4.2	11.3	7.2
1991 - 1995	8.18	4.09	12	8.6
1996 - 2000	6.94	4.3	10.6	5.75
Average annual growth rate for period 2001 - 2010	7.26	3.58	9.09	7.35
2001 - 2005	7.51	3.83	10.25	6.96
2006 - 2010	7.01	3.34	7.94	7.73

Source: General Statistics Office, 2010.

Obviously, Vietnam's trade had many benefits from trade liberalization due to economic integration. Total export of Vietnam's goods and services to group countries increased dramatically as shown in Figure 3.2, it was 5,448.9 million USD in 1995 and 72,236.7 million USD in 2010, more than 13 times in comparison with its achievement in 1995. However, almost of total export of Vietnam's goods derived from some main goods, such as crude oil, coal, textile, rice, and cafe. For the period 2001 - 2010, Vietnam exported approximately 15 million tons of crude oil per year, double times in comparison with the period 1995 - 2000, 19.876 million tons coal in 2010 - nearly five times

and seven times in comparison with coal exported in 2000 and in 1995, respectively. It is clear that, export of Vietnam mainly depends on natural resources.

Figure 3.2: Total export to group countries from 1995 - 2010 (million USD)

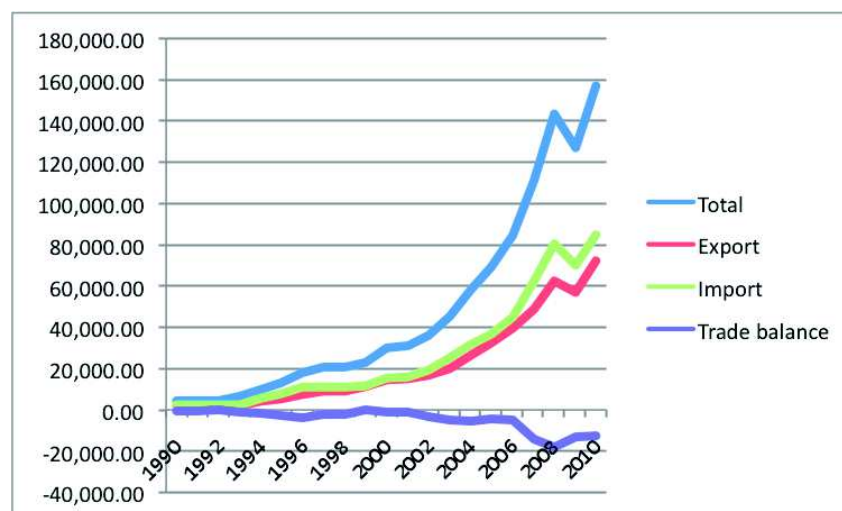


Source: General Statistics Office, 2015.

Whilst almost of export goods was raw products, Vietnam imported completed products from other countries. It caused the deficit in trade balance. According to General Statistics Office in 2015, the more export Vietnam did, the more deficit in trade balance obtained (Figure 3.3 shows the detail).

Kokko (1998) stated that even though developing countries might be accepted their trade balance deficit because these countries need to import necessary things for production such as machinery, equipments, and intermediate goods for all economic sectors. However, the author indicated that trade deficit is harmful for economy in the long term. Vietnam's government seems to recognize this issue and implement strictly regulations on trade activities, for instance, create strong incentives for import-substitution strategy, strict import regulate on non - necessary goods, adjust foreign exchange regime (see Kokko et al, 2007).

Figure 3.3: Export, import and trade balance from 1995 to 2010 (million USD)



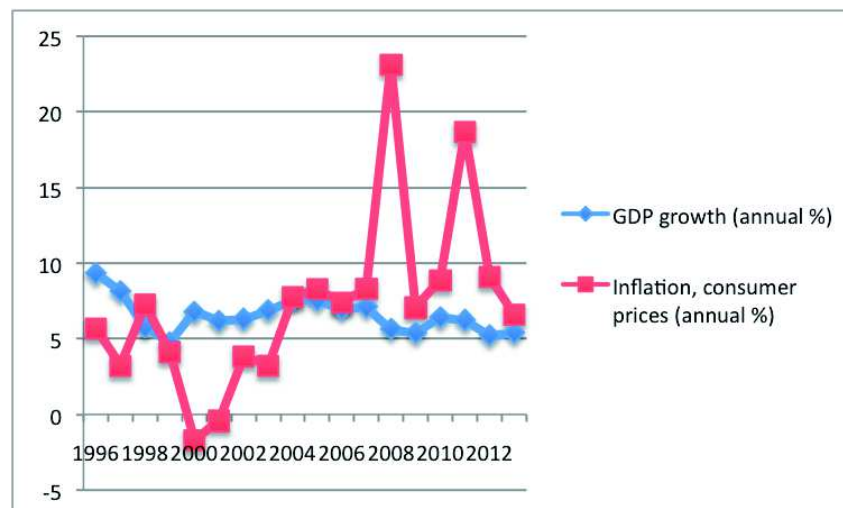
Source: General Statistics Office, 2015.

3.2.2 Inflation control

One economic indicator which researchers and policy makers pay much attention is inflation in Vietnam's economy. In literature, some authors stated inflation has a significantly negative effect on economic growth, for instance, Barro (1995), Gokal and Hanif (2004), Gregorio (1992) and Jones and Manuelli (1995). Kokko et al. (2007) in a research about Vietnam's economy supposed that in spite of economic growth was positive, the inflation was too high in the period 1986 - 1991, the inflation rate recorded at 300 percent in 1985 and 430 percent in 1986 (some information recorded differences of inflation rate in free market, for example 600 percent and 774.7 percent, see Leung and Vo, 2013 and Government report, 2015). At that time, the inflation rate did not seem to be avoided. To explain reasons of hyperinflation of Vietnam, some authors showed that Vietnam has no experience in implementing market economy, the price does not reflected the market commodities because the government remains its conduction same to centrally planned economy in which prices are determined by political decisions due to economic plan objectives. Furthermore, the imbalance in trade, dual track prices,

two tier-bank system, Vietnam implements monetary reform - exchange a new Dong for ten old Dong caused the hyper-inflation (see Lipworth and Spittaller, 1993 and Kokko et al. 2007). Thanks to integration, some new regulations to adopt to multi-bilateral and bilateral agreements were published, Vietnam controlled the inflation in 1990s very well. Vietnam's economy had impressive growth rates which were higher than inflation rate in period of 1996 - 2004. Particularly, the inflation rates in 2000 and 2001 were negative as a results of Asia financial crisis in 1997. However, the inflation rates were higher than economic growth from 2004, especially inflation rate was about 23% in 2008 as a results of the global economic depression in 2008 (see detail in Figure 3.4).

Figure 3.4: Growth and inflation rate from 1996 to 2014



Source: World Development Indicators, 2015

In the same period, some countries had a lower growth rate of economy while inflation rates were higher than Vietnam. Particularly, Asia financial crisis in 1997 impacted on almost of all Asia countries that led to their negative growth rates while Vietnam had a positive growth rate and inflation rate was acceptable. For instance, GDP growth rate of Japan was -2%, Indonesia -13.1%, Malaysia -7.35%, Philippine -0.57%, Singapore -2.2%, Korea -5.7% and Vietnam 5.76% (more detail can be found in Figure 3.5). Some people supposed that Vietnam has a little impact of Asia financial crisis because at that time the integration level of Vietnam's economy was not deep enough and openness of Vietnam's financial market was not large that seems to affect capital flows. Furthermore, Vietnam implemented a exchange rate mechanism, float exchange rate regime with the State management that helps to react effectively to crisis.

Figure 3.5: Growth and inflation rate from 1996 to 2014 in comparison with some countries (annual %)

Country Name	Indicator	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
China	GDP growth	10.00852	9.297034	7.833347	7.619836	8.431279	8.300318	9.082068	10.02538	10.08504	11.31004	12.67653	14.1624	9.634668	9.214199	10.44699	9.299885	7.652553	7.671191
	Inflation	8.324015	2.806843	-0.844626	-1.407892	0.255305	0.722903	-0.765949	1.15591	3.884183	1.821648	1.463189	4.750297	5.864384	-0.702949	3.314546	5.41083	2.65244	2.630845
India	GDP growth	7.549522	4.049821	6.184416	8.845756	3.840991	4.823966	3.803575	7.860381	7.922937	9.284832	9.263965	9.80136	3.890957	8.479787	10.25996	6.638353	4.736288	5.016994
	Inflation	8.977149	7.164254	13.23084	4.669821	4.009434	3.684807	4.3922	3.805866	3.767238	4.246353	6.145522	6.369997	8.351816	10.87739	11.9923	8.857845	9.312446	10.90764
Japan	GDP growth	2.610055	1.595629	-2.003148	-0.199337	2.257495	0.355462	0.289548	1.685112	2.36073	1.302728	1.692904	2.192186	-1.041636	-5.526976	4.65203	-0.452725	1.75369	1.613367
	Inflation	0.131872	1.761462	0.663269	-0.32945	-0.653015	-0.803376	-1.310883	0.167795	-0.008275	-0.273111	0.240664	0.057952	1.37349	-1.346719	-0.719782	-0.283333	-0.033428	0.359472
Indonesia	GDP growth	7.642786	4.699873	-13.12672	0.79113	4.920065	3.643466	4.499475	4.780369	5.030874	5.692571	5.500952	6.345022	6.013704	4.628871	6.223854	6.485633	6.263671	5.781224
	Inflation	7.96848	6.229896	58.38709	20.48912	3.720024	11.50209	11.87876	6.585719	6.243521	10.45196	13.10942	6.407448	9.776585	4.813524	5.132755	5.3575	4.279512	6.413387
Vietnam	GDP growth	9.340017	8.152084	5.764455	4.773587	6.787316	6.192893	6.320821	6.899063	7.536411	7.547248	6.977955	7.129504	5.661771	5.397898	6.423238	6.240303	5.247367	5.421344
	Inflation	5.675	3.209526	7.266198	4.117102	-1.710337	-0.431545	3.830828	3.21989	7.759131	8.281422	7.385787	8.303789	23.11632	7.054558	8.8616	18.67748	9.094216	6.592256
Malaysia	GDP growth	10.0027	7.322743	-7.359415	6.13761	8.858868	0.517675	5.390588	5.788499	6.783438	5.332139	5.584847	6.298786	4.83177	-1.513685	7.42597	5.187251	5.644607	4.73392
	Inflation	3.488559	2.662515	5.270342	2.744561	1.53474	1.416785	1.807872	0.992816	1.518542	2.960865	3.609236	2.027353	5.440782	0.583308	1.710037	3.2	1.655362	2.105012
Philippines	GDP growth	5.845873	5.185362	-0.576722	3.081927	4.411213	2.893992	3.645898	4.970364	6.697636	4.777663	5.242953	6.616669	4.152757	1.14833	7.632264	3.659755	6.801331	7.181122
	Inflation	7.513661	5.590851	9.265945	5.947137	3.950104	5.345502	2.722772	2.289157	4.829211	6.516854	5.485232	2.9	8.260447	4.219031	3.789836	4.647303	3.172086	2.997694
Singapore	GDP growth	7.531934	8.291118	-2.22523	6.095204	8.897544	-0.95229	4.211687	4.435328	9.549175	7.489157	8.860196	9.111527	1.78762	-0.603388	15.24038	6.056872	2.503729	3.851064
	Inflation	1.383181	2.003586	-0.267502	0.01671	1.361624	0.997198	-0.391677	0.507905	1.662727	0.425106	1.020916	2.095144	6.51859	0.603622	2.8	5.252918	4.528651	2.387268
Korea, Rep.	GDP growth	7.185917	5.766741	-5.713898	10.73059	8.831278	4.525319	7.432434	2.933207	4.899852	3.923687	5.176134	5.463406	2.829214	0.707518	6.496785	3.681705	2.292382	2.97111
	Inflation	4.923429	4.446869	7.51208	0.811448	2.265333	4.06692	2.763063	3.513821	3.591024	2.754384	2.241726	2.534348	4.674315	2.757001	2.955863	4	2.192308	1.307866
Cambodia	GDP growth	5.412339	5.619793	5.009033	11.90976	8.766785	8.038632	6.687881	8.505899	10.34053	13.25009	10.77109	10.21257	6.691577	0.086697	5.963079	7.06957	7.313346	7.406142
	Inflation	7.150861	7.960214	14.8065	4.008207	-0.791993	-0.600648	3.225084	1.210011	3.924782	6.349255	6.143256	7.668393	24.99718	-0.661308	3.99623	5.478587	2.932725	2.9426

Source: World Development Indicators, 2015

3.2.3 Poverty reduction

In terms of poverty reduction, Vietnam has a great achievement since started economic reform. [Fan and Long \(2004\)](#) stated that Vietnam make substantial and steady progress in poverty reduction over the two decades. The ratio of the people living below the poverty lines to total population decreased rapidly, from over 70% at the end of 1980s to 58% in 1993, 37% in 1998, and 29% in 2002. The absolute number of poor people living dropped sharply. Table 3.4 shows that number of poor people declined from 39.8 millions people in 1993 to 12.3 millions people in 2008. Based on both poverty lines, number of poor people reduced sharply for the period 1993 - 2008.

Table 3.4: Reduction in number of poor people from 1993 to 2008

Poverty standard	Number of poor (millions)		
	1993	1998	2008
Official GSO-WB poverty line: consumption	39.8	28.2	12.3
1.25 USD/day (2005 PPP): consumption	43.6	37.5	14.3
2.00 USD/day (2005 PPP): consumption	58.7	59.0	36.9

Source: World Bank report, 2012

One economic indicator which may reflect poverty reduction is general national income (GNI) per capita. Within two decades, GNI per capita of Vietnam increased near eight times, from 220 USD in 1989 to 1740 USD in 2013 similar to the level of India (more detail can be found at Figure 3.6). Furthermore, according to Government report in 2010, the ratio of poor people to total population decreased dramatically not only for entire country but also for each region. Table 3.5 shows evidence in the detail.

Figure 3.6: GNI per capita of Vietnam for period 1989 - 2013 (USD)

Country Name	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
China	320	330	350	390	410	460	530	650	750	790	850	930	1000	1100	1260	1490	1740	2040	2470	3050	3610	4240	4900	5730	6560
United States	24130	24530	24720	26220	27080	28280	29490	30600	31430	31940	33670	35740	36450	37220	39900	43650	46220	47340	48690	49680	48300	49110	50350	51920	53470
India	400	390	350	350	330	350	380	410	420	420	450	460	470	470	530	630	740	820	960	1050	1170	1290	1450	1550	1570
Brazil	2750	2700	2870	2780	2740	3040	3730	4460	5050	4870	4130	3860	3290	3050	2950	3310	3960	4800	6100	7480	8140	9520	10700	11640	11690
Mexico	2290	2740	3180	3670	4420	5150	4520	4280	4260	4570	5030	5690	6180	6510	6790	7310	7650	8240	8830	9360	8530	8730	9000	9720	9940
United Kingdom	16400	17350	18080	20050	19980	20410	20750	21950	23510	24870	26020	27230	27040	27420	30640	36170	41010	43430	46110	46870	42650	40470	40090	40600	41680
Argentina	2910	3180	3960	6300	7100	7570	7360	7730	8140	8020	7570	7470	7000	4050	3670	4360	5420	6290	..	..	..	..	..	..	..
Japan	26640	27560	28290	30190	33170	36590	41270	42030	39220	33480	32830	34970	35600	33750	34010	37150	39140	38600	37660	37870	37610	42190	45190	47830	46330
Indonesia	560	620	620	680	810	890	1000	1110	1110	670	580	570	680	730	910	1090	1230	1390	1610	1950	2160	2500	2920	3420	3580
Pakistan	410	410	410	430	440	440	470	480	480	450	450	470	480	500	540	620	710	800	890	990	1040	1060	1140	1250	1360
Germany	19780	21330	22910	25850	25980	27520	29550	30880	30160	27950	26840	26170	24750	23680	26210	31710	35880	38380	40730	43910	43810	44780	46410	46700	47270
Vietnam	220	130	110	130	170	200	260	310	350	360	370	400	430	460	510	590	680	760	850	1000	1120	1270	1390	1560	1740
Turkey	1920	2300	2590	2940	3150	2680	2850	2920	3190	3410	3530	4190	3470	3480	3810	5070	6520	7520	8500	9340	9130	9980	10510	10810	10970
Malaysia	2240	2370	2530	2850	3200	3560	4010	4450	4570	3600	3350	3420	3510	3760	4130	4700	5240	5810	6600	7500	7590	8150	8840	9820	10430
South Africa	3580	3390	3320	3320	3460	3610	3740	3760	3680	3290	3150	3050	2830	2610	2840	3600	4810	5420	5690	5750	5630	6000	6850	7460	7190
Russian Federation	..	..	3420	3070	2900	2650	2650	2610	2650	2130	1750	1710	1780	2100	2580	3410	4460	5830	7600	9640	9290	10010	10820	12740	13850
Australia	15600	17340	18220	18530	18900	18870	19300	20500	21960	21770	21430	21110	20110	19960	21110	25500	30320	34160	37330	42380	44000	46490	50060	59770	65390

Source: World Development Indicators, 2015

Table 3.5: Ratio of poor people to total population for period 2004 - 2010 (%)

Region	2004	2006	2007	2008	2009	2010
Entire country	18.1	15.5	14.8	13.4	12.3	10.7
Red River Delta	12.7	10.0	9.5	8.6	7.7	6.4
Northern upland	29.4	27.5	26.5	25.1	23.5	22.5
North and Central Coast	25.3	22.2	21.4	19.2	17.6	16.9
Central Highlands	29.2	24.0	23.0	21.0	19.5	17.1
Southeast	4.6	3.1	3.0	2.5	2.1	1.3
Mekong Delta	15.3	13.0	12.4	11.4	10.4	8.9

Source: Vietnam Government Report, 2010.

Generally, Vietnam has succeeded in economic reform and achieved many giant results, for example, from low - income to middle - income economy, improved standard of living, sustainable growth rate, and controlled inflation.

3.3 Taxation system reform programs: An important role on economic development

Martinez-Vazquez and McNab (2000) stated that the centrally planned economies duplicated the tax system of Soviet Union and Vietnam is not exception. Almost of taxes revenue comes from public enterprises that levied on turnover tax, profit tax, and payroll tax.

The taxation system started a transition from 1986, at that time, Vietnam determined the role of taxation on economic development. First, instead of planning focused bureaucratic mechanism, taxation system has been designed as a guide line, redistribution, and macroeconomic management tool. Furthermore, taxes has to ensure the public budget revenue stability and meet international standards (for instance, taxes are fair to all sectors in economy). In order to implement new strategy in taxation system, the first taxation system renovation was started in 1990 (see GDT, 2015) by Resolution of National Assembly of Vietnam intake VIII, dated December 28th, 1989 in which the 9 kinds of tax have been considered to issue, consist of (1) Revenue tax, (2)

Goods tax, (3) Export - Import taxes, (4) Agriculture tax, (5) Nature resources tax, (6) Profit tax, (7) House - Land taxes, (8) Individual income tax, and (9) Capital tax.¹ In particular, capital tax applied for the state sector and it was assigned to government to regulate by resolution. Moreover, Vietnam's government issued some regulations which contribute to the public budget as such lottery charges, fees, and international labour cooperation fees.

In general, for the period of 1986-1996, total public revenue was increased by 30.75 times in comparison with its revenue in the period of 1981-1985. The public sector accounted for 64.2% of total revenue, non-state sector accounted for 19.6%, and the rest of total revenue came from others. On the other hand, [Quang and Dung \(1997\)](#) stated that taxes revenue accounted for around 20% of total revenue in 1986 in which public enterprises contribute up to 70% (similar to Chan and Whalley, 1999). Meanwhile taxes and fees revenue accounted for 85% of total revenue in 1996 and ratio of public enterprises to total revenue decreased to 50%. In other research, [Hoang-Anh \(2007\)](#) indicated that revenue come from taxes and fees accounted for 95.09% of total revenue, average ratio of taxes and fees to total revenue for period of 1990 - 1995 and 1996-2000 accounted for 95.75% and 94.8% respectively.

Despite having important achievements, Vietnam's taxation system faced to many challenges in 1990s as a member of ASEAN in order to adopt with this group principles, free trade agreements, and agreements with US in terms of normalization in 1994. Vietnam's integration into AFTA (Area of Free Trade Asia) had to follow a process over the next decade by implementing CEPT (Common Effective Preferential Tariff) which required Vietnam has adopted its tariff, foreign exchange mechanism, customs, and some things relevant to trade procedure, non-tariff barriers, and so on (see Truong and Gates, 1996). The authors also indicated that within 10 years participated to this

¹The National Assembly of Vietnam proved by laws on revenue tax (June 30th, 1990), special consumption tax (June 30th, 1990), profit tax (June 30th, 1990), export - import taxes (December 26th, 1991), agricultural land use tax (March 10th, 1993), Land use right transfer tax (July 1st, 1994) and natural resources tax (March 30th, 1990), high income tax (December 27th, 1990), and house - land taxes (July 30th, 1992) regulated by ordinances.

organization, Vietnam has to reduce about 857 tariff lines for 18 sectors and 1,622 goods for tariff reduction. Adopting AFTA regulations, Vietnam has to reduce the tariff rates to 0 - 5% on the goods came from AFTA's members. Actually, It did not seem a problem for Vietnam because at that time more than 2,200 tariff lines has been done by Vietnam .

Although the taxation system had improved via the first taxation reform (in 1989), it remained some disputed issues. First, the regulations of taxes did not cover all liability to taxes payers, for instance, the high income tax regulated that individuals with high income which determined by Government has to pay income tax. Therefore, there were many people who had income lower than a certain income would not pay income taxes. Second, tax administrations were so complicated, tax payers spent so much time on doing administrative procedures. Third, Vietnam had a few agreements with another countries that prevented to tax on goods twice. Fourth, taxation office organized by many levels with large number of tax collectors and applied technology in the taxation system was poor that led to spending on tax collection is higher than tax revenue in some cases. Last one, it was not clear regulations which divided the percentage of tax revenues between central government and local government, it seemed that there was no decentralization of tax revenues for this period.

Vietnam recognized these issues and continued to renovate taxation system for the new period 1996 - 2004. In this period, Vietnam changed and amended many current tax regulations such as cooperate income tax, import - export taxes, value added tax, ext...Especially, National Assembly of Vietnam proved the State budget law in 2002 and took effect in 2004. The State budget law regulated the types of tax which central government and local government were beneficiaries, for example, the article 20 of decree No. 60/ND-CP issued by Vietnam's government on June 6, 2003 detailing and guiding the implementation of the State budget law. On the one hand, this Decree regulated some kinds of tax assign to the central budget revenue, for instance, value added tax on import goods, export and import tax, and nature resources tax. On the other hand, local governments were benefited by house and land tax, license tax, agricultural land

use tax and so on (the detail can be found at Appendix 1).

The State budget law also regulated proportion of divided revenue between local government and central government. For example, at least 79% of revenue come from land transferred, house and land tax, license tax, agricultural land use tax, registration fee assigned to the ward and district level; at least 50% of revenue come from registration fee excluded house and land registration fee also assigned to sub-provincials level. Obviously, the state budget law took effect in 2004 was good news for both management and governance of authorities. This law solved many problems of Vietnam's economy then obtained some great results. Table 3.6 shows the proportion of each kind of tax in total tax revenues for period 2003 - 2011.

Table 3.6: Proportion of taxes for the period 2003 - 2011 (%)

Item	2003	2004	2005	2006	2007	2008	2009	2010	2011
Current revenue	100	100	100	100	100	100	100	100	100
Taxes	87.74	86.34	87.37	89.57	89.80	92.50	89.11	92.01	94.41
Corporate income tax	32.51	31.62	34.56	37.82	34.96	34.97	26.78	28.32	29.91
Individual income tax	2.02	1.95	1.93	1.96	2.48	3.30	3.42	5.00	5.87
Land and housing tax	0.25	0.24	0.23	0.23	0.24	0.23	0.29	0.27	0.24
Business license tax	0.53	0.36	0.33	0.30	0.30	0.26	0.28	0.25	0.23
Tax on transfer of properties	1.53	1.80	1.72	1.75	2.66	2.64	2.37	2.40	2.40
Value added tax	22.72	21.54	20.91	20.90	23.34	23.32	25.92	29.53	29.30
Special consumption tax	6.07	7.09	7.16	6.52	5.81	5.64	7.10	7.11	6.51
Natural resource tax	6.66	9.65	9.68	10.09	7.18	6.71	4.56	5.01	5.82
Agriculture land - use tax	0.10	0.07	0.06	0.04	0.04	0.02	0.02	0.01	0.01
Import-export taxes	15.34	11.99	10.78	9.96	12.81	15.41	18.39	14.11	12.42
Environment protection tax	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.71
Fees, Charges, and non - tax revenue	12.26	13.66	12.63	10.43	10.20	7.50	10.89	7.99	5.59
Fees and charges (including gasoline fee)	4.45	4.31	3.71	3.39	3.66	3.13	4.38	3.91	1.58
Rental of Land	0.35	0.57	0.46	0.61	0.73	0.90	0.80	0.72	0.90
Others	7.46	8.65	8.46	6.60	5.81	3.47	5.71	3.36	3.12

Source: Ministry of Finance of Vietnam, 2014.

During the period, the tax revenue contributes to more than 90% of total current revenue in which corporation income tax and value added tax accounted for more than 60% of total recent revenue while the proportion of fees, charges, and non-tax revenue decrease slightly, was only 5.59% of revenue in 2011. Vietnam published the Law of environment protection in 2010 and it took effect in 2011 that revenue came from tax on environment protection contributed about 1.7% of revenue. The sustainability of tax

revenue plays very important role on economic development because it impacts on both government expenditure levels, central government and local government. However, total revenue of state relies on main two kinds of taxes meanwhile the proportions of other taxes increase slowly, for instance, individual income tax accounts for nearly 6%, tax on transfer of properties contributes about 2.4% of revenue.

3.4 Expenditure decentralization and debt: Achievement and challenge

3.4.1 Expenditure decentralization

Fiscal decentralization is studied by many authors around the world such as [Tiebout \(1961\)](#), [Oates \(1993\)](#), [Bird and Vaillancourt \(2008\)](#), [Bodman \(2011\)](#) and so on. Almost of findings indicated that fiscal decentralization has a positive impact on economic growth in terms of allocation. [Salotti \(2016\)](#) studied about expenditure decentralization and the composition of local public spending in the period 1972 -2006 in OECD countries, stated that tax decentralization plays very important role for the most decentralized spending categories. Hence, the authors indicated that tax decentralization is positive relation with healthcare, housing, education, and public order expenditure while it is negative association with social protection expenditure decentralization. However, there are a few researches about public expenditure decentralization in Vietnam. [Rao \(2000\)](#) stated that the state budget law in 2002 and took effect in 2004 mentioned clear responsibilities of local and central government in terms of public expenditure but the level of expenditure followed a functional separation based on the principle of geographical spread of benefit, size of the projects and volume of spending. In addition, the volume of spending in each province is determined not only by total taxes collection that 100% assigned to local government but also provided approximately 50% of difference with regard to the excess of targeted revenues. [Rao \(2000\)](#) also showed that expenditure decentralization in Vietnam measured by the share of local administration in total expenditure increases from 26% in 1992 to 43% in 1998. Furthermore, the State budget law regulated the budget procedure for approval. For instance, local government and

State agencies prepare the budget plan based on the guidelines and norms then submit them to Ministry of finance. Next, the Ministry of finance consolidates the estimates from other ministries, organizations and provinces. The final budget plan is submitted to National Assembly of Vietnam. One important thing, the Law also regulated that budget is planned for certain objectives, national programs, and purposes which can not be transferred to another agencies and another tasks. The provincial-level People's Councils shall decide on decentralization of spending tasks to various budget levels of the local administrations according to the principles.

In practice, Ministry of Finance prepares the final budget plan that is submitted to National Assembly of Vietnam, the Law determined the responsibility of Ministry of Planning and Investment for appraisal and allocation of public investment. That means provinces and other ministries have planned their investment in particular projects or infrastructure programs then submit them to Ministry of Planning and Investment. In general, Ministry of Finance responses to current expenditures and Ministry of Planning and Investment is assigned to consider investment expenditures at national level. The procedure of budget plan at provincial level is similar. The finance department of each level of province prepares for budget plan then submit them to the people's council at the same level before submitting to the high level of the province. Obviously, the budget for certain tasks can not be transfer to another tasks or another levels.

In other research, [Martinez-Vazquez \(2004\)](#) stated that there is a huge change in expenditure decentralization in Vietnam defined by the State budget law in 2002. It is similar opinion with [Rao \(2000\)](#), the author supposed that the huge change in expenditure decentralization is that the Public budget law lists expenditure assignment for central government and local governments. In this research, [Martinez-Vazquez \(2004\)](#) found that the share of local governments expenditure in total expenditure (national budget) was about 38% in average in the period 1996 - 2002 and reached over 43% in 2001-2002 then fell again to 37% in 2002.

Based on the State budget law, Vietnam government publishes the guideline in which central expenditure and local expenditure were determined and classified in the

detail. For instance, central government's spendings include public investment, security and defense, national target programs.² (more detail can be found in Appendix 1)

Vietnam government stated that the central expenditure and local expenditure accounted for 64% and 36% of total State expenditure in 2004 respectively; 56.3% and 43.7% of total State expenditure in case of transfers for national target programs accounted for local government. In 2013, the local expenditure increased to 43.7% of total State expenditure, if transfers for national target programs took into account, the local expenditure was 50.1% total State expenditure.³ The Proposal No. 424/TTr-CP also stated that the growth of expenditure on public investment increases 13.5% per year in average and it is accounted for 8% GDP approximately. In particular, the ratio of expenditure on education and training, information and technology sector, and environmental activities to total revenue are about 20%, 2%, and 1.0% respectively. Recently, there are 13 provinces in Vietnam including Hanoi, Haiphong, Quangninh, Vinhphuc, Bacninh, Danang, Quangngai, Khanhhoa, Hochiminh city, Dongnai, Binhduong, Baria-Vungtau, and Cantho whose total revenue exceeded local government spending for the period 2011-2015 (previous period 2007-2010, there were 12 provinces whose total revenue exceeds local government expenditure, except Bacninh province). The Table 3.7 shows the proportion of total revenue these provinces for 2 periods 2007-2010 and 2011-2015.

Despite the government expenditure is high position in Vietnam (Martinez-Vazquez, 2004), the State budget law contains some issues. First, the procedure of budget plan is top-down process, it takes time for approval and is not flexible. The State budget law regulates the procedure of budget plan for next fiscal year that government finalizes the budget plan then submits to National Assembly of Vietnam prior to at least 10 days of the second plenary of National Assembly of Vietnam (normally, the second plenary of National Assembly of Vietnam starts on Oct 20 yearly). Consequently provinces may

²see the Decree No.66/2003/ND-CP dated June 6, 2003 detailing and guiding the implementation of the state budget law

³see the Proposal No. 424/TTr-CP on amendment to the state budget law that submitted to National Assembly of Vietnam on Oct 17, 2014

prepare budget plan for next year on August and sub-local government might prepare on June or July). Next, the National Assembly of Vietnam proves budget plan and budget allocation for local governments and central government before Nov 15 yearly. Then provincial People's Councils allocate the approved budget for sub-local governments before Dec 10 every year. Obviously, the information for analysis from beginning of budget plan to approved date is not up to date that may not reflect the economic situation. Therefore, the budget plan seems to be not accurate. Second, the Public budget law regulates the right of provinces that allows them to issue local government bonds for public investment purposes. However, total local government bonds is not exceed 30% of local public investment, except Hanoi and Hochiminh city (100%). This regulation does not meet demands of provinces for development. Third, some kinds of fees and charges, revenue from lotteries do not take into account, the local people's councils decide to spend these revenues on education, and healthcare. Fourth, as the regulations of Public budget law, provinces are allowed to reduce fees, charges, some certain taxes such as corporate income tax, land use tax, and so on which assign to local governments that leads to compete between provinces to attract investors because provinces may increase their revenue then their expenditure increases, consequently. This may distort the national programs in industry, agriculture, and services sectors.

3.4.2 Public debt

Regarding public debt, it is emerging issue in Vietnam. Although Vietnam published a law in which public debt consists of 3 types, central government debt, central government guaranteed debt, and local government debt, there are many controversies about the threshold of public debt and definition of public debt.⁴ Recently, the ratio of public debt and government debt to GDP is regulated the threshold of public debt at the end of 2015 is not over 65% of GDP and not over 50% of GDP for central government debt. Table 3.8 shows the public debt for the period 2011-2014. ⁵

⁴see Law No.29/2009/QH12 dated June 17th, 2009 on public debt management

⁵ see the Resolution No.10/2013/QH published by National Assembly of Vietnam

Table 3.7: Proportion of total revenue assigned to some local governments and central government before central transfer

Province	2007-2010		2011-2015	
	Local government	Central government	Local government	Central government
Hanoi	31%	69%	42%	58%
Haiphong	90%	10%	88%	12%
Quangninh	76%	24%	70%	30%
Vinhphuc	67%	33%	60%	40%
Bacninh	100%	0%	93%	7%
Danang	90%	10%	85%	15%
Quangngai	42%	58%	61%	39%
Khanhhoa	53%	47%	77%	23%
Hochiminh city	26%	78%	23%	67%
Dongnai	45%	55%	51%	49%
Binhduong	40%	60%	40%	60%
Baria-Vungtau	46%	54%	44%	46%
Cantho	96%	4%	91%	9%

Source: Ministry of Finance, 2008 and 2012

Table 3.8: Public debt for the period 2010-2014 (billions VND)

Type of debt	2010	2011	2012	2013
Total outstanding public debt	1,115,040	1,392,020	1,629,049	1,912,719
Government debt	882,750	1,092,761	1,261,410	1,488,011
Government guaranteed debt	225,514	288,375	343,100	394,691
Local government debts	6,776	10,884	24,540	30,016
Ratio of total outstanding public debt to GDP	51.7%	50.1%	50.2%	53.4%
Ratio of central government debt to GDP	40.9%	39.3%	38.9%	41.5%

Source: Government report No. 177/BC-CP on public debt management, dated May 26th, 2014.

Furthermore, Vietnam's government stated that the ratio of total public debt to GDP was 60.3% in 2014 and 64% at the end of 2015 estimate. It is clear that the ratio of public debt and ratio of government debts to GDP do not exceed the thresholds as regulated by the Law and Resolution.⁶ However, the ratio of public debt to GDP increases to the threshold very quickly. In fact, there is a dispute about the threshold of public debt, for example, Maastricht Treaty regulates 60% of GDP for the threshold of public debt in European zone meanwhile many countries do not regulate the threshold. In a research, [Reinhart and Rogoff \(2010\)](#) showed that if the ratio of central government debt to GDP is below 30%, the average GDP growth is 3.7%, in terms of the ratio of central public debt to GDP is 30-60%, 60-90%, and over 90%, the average GDP growth is 3.0%, 3.4%, and 1.7% respectively. Actually, it seems that there is no standardization of the threshold of public debt, given threshold of public debt may prefer political decision to public debt theory.

3.5 Conclusion

Over 25 years implemented the renovation program or "Doi moi", Vietnam succeeds in economy's transition. Growth rate of economy increases highly in comparison with some countries in area, poverty reduction declines dramatically, and inflation rate is controlled. Moreover, Vietnam has great achievements based on taxation reforms in which taxation policy is not only help Vietnam to obtain sustainably revenue but also to adopt with agreements between Vietnam and ASEAN, European zone, the United States of America and so on. In addition, Vietnam has a huge step in expenditure decentralization via regulations of the State budget law which determines clearly the role of National Assembly of Vietnam, government, local governments, and other organizations. Furthermore, the Law on public debt management is published that regulates responsibilities of central government, local governments and relative organizations in using and managing debts. By Resolution of National Assembly of Vietnam, the thresh-

⁶the Letter No.8633/VPCP-TKBT sent to senators dated Oct 30th, 2014

old of public debt and government debt are figured out in order to assure financial security. In general, from centrally-planned economy to market oriented economy, Vietnam becomes a middle-income country with impressive results of renovation and it is alike a tiger economy in the 21st century.

However, Vietnam is facing some challenges in development due to high level of global integration, for instance, quality of human resources, level of technology, public debt, capital, and legal framework. These issues require Vietnam government to implement new strategies in education, infrastructure development, investment policy, and legal framework in order to obtain great achievements for the next period.

Appendix 1. Revenue and expenditure assign to central and local government

Article 21.- The central budget expenditures include: 1. Development investment expenditures on:

- a) Investment in the construction of centrally-managed socio-economic infrastructures with capital being unrecoverable,
- b) Investment and support for enterprises, economic organizations, contribution of equity capital, joint-venture capital to enterprises in domains necessarily requiring the State's participation as provided for by law,
- c) Expenditures on financial support, capital supplement, export support and reward for enterprises and economic organizations according to law provisions,
- d) Development investment portions in national target programs and State projects, which are implemented by central agencies,
- e) Expenditures on support for the centrally managed finance organizations of the State,
- f) Expenditures on supplement to the State reserve,
- g) Other development investment expenditures as provided for by law.

2. Regular expenditures on:

a) Educational, training, vocational training, medical, social, cultural-information, literary and artistic, physical training and sport, scientific and technological, environmental and other non-business activities managed by central agencies:

- General education boarding schools for ethnic minority pupils,
- Post-graduate, university, collegial, intermediate vocational and vocational training as well as other forms of training and fostering,
- Disease prevention and combat and other medical non-business activities,
- Sanatoriums for war-invalids, people with meritorious services to the revolution, social relief establishments, social-vice prevention and combat as well as other social activities;

- Conservation, museums, libraries, renovation of classified historical relics, literary and artistic creation activities as well as other cultural activities,
- Radio, television and other information activities,
- Fostering and training of coaches and athletes for national teams; national and international tournaments; management of physical training and sport competition facilities as well as other physical training and sport activities,
- Scientific research and technological development,
- Other non-business activities.

b) Economic non-business activities managed by central agencies:

- Communications non-business activities: maintenance and repair of bridges, roads and other traffic works, placing road signs and adopting measures to ensure traffic safety on various routes,
- Agricultural, irrigation, fishery and forestry non-business activities: maintenance and repair of dyke systems, irrigation works, agricultural, fishery or forestry farms and stations; forestry, agricultural and fishery promotion work, zoning off for aquaculture, forest protection, forest fire prevention and fighting, aquatic resource protection,
- Basic surveys,
- Administrative boundary delimitation,
- Map making,
- Border delimitation and border-marker placing,
- Cadastral measurement and mapping, cadastral dossier archival,
- Sedentary farming and settlement, new economic zones,

- Environmental non-business activities,
 - Other economic non-business activities.
- c) Defense, security, social security and order tasks financed by the central budget under the regulations of the Government,
- d) Activities of the National Assembly, the State President, the ministries, the ministerial-level agencies, the Government-attached agencies, the systems of People's Courts and People's procuracies,
- e) Activities of the central agency of the Communist Party of Vietnam,
- f) Activities of the central bodies of Vietnam Fatherland Front, Vietnam Labor Confederation, Vietnam War Veterans' Association, Vietnam Women's Union, Vietnam Peasants' Association, Ho Chi Minh Communist Youth Union,
- g) Price subsidies under the State's policies,
- h) Regular expenditure portions in the national programs and State projects, which are implemented by central agencies,
- i) Implementation of regimes towards persons who retire or leave their jobs due to poor health conditions as prescribed in the Labor Code for subjects covered by the central budget, support for the Social Insurance Fund according to the Government's regulations,
- j) Realization of policies toward war-invalids, diseased army men, war martyrs and their relatives, families with meritorious services to the revolution and other social policy beneficiaries,
- k) Support for centrally-managed political, socio-professional organizations, social organizations as provided for in Article 17 of this Decree,
- 3) Other regular expenditures as prescribed by law.
4. Payment of principals and interests for amounts borrowed by the Government.
5. Aid provided for foreign governments and/or organizations.
6. Loans provided under the provisions of law.
7. Supplements to the Central Financial Reserve Fund.

8. Supplements to local budgets.

9. Expenditures transferred from the previous year's central budget source to the following year's central budget source.

Article 24, The local budgets' spending tasks include:

1. Development investment expenditures on:

a) Investment in the construction of socioeconomic infrastructures with locally-managed capital being unable to be retrieved;

b) Investment in, and support for, enterprises, economic organizations and financial organizations of the State under the provisions of law;

c) Development investment portions in the national programs implemented by local agencies;

d) Other development investment expenditures as prescribed by law.

2. current expenditures on:

a) Educational, training, vocational training, medical, social, cultural-information-literary-artistic, physical training and sport, scientific and technological, environmental and other non-business activities managed by localities:

- General education, complementary education, creches, kindergartens, boarding general education schools for ethnic minority pupils and other educational activities;
- University, collegial, intermediate-education, vocational training, short-term training and other forms of training and fostering;
- Disease prevention and treatment and other medical activities;
- Social charity camps, social relief, hunger, reduction, social vice prevention and combat and other social activities;
- Conservation, museums, libraries, art performances and other cultural activities;
- Radio, television and other information activities;

- Fostering and training of coaches and athletes for provincial teams; provincial tourneys; managing establishments for physical training and sport competitions as well as other physical training and sport activities;
- Scientific research, technological development;
- Other non-business activities managed by localities.

b) Economic non-business activities managed by localities:

- Non-business communications activities: consolidation, maintenance and repair of bridges, roads and other communications works; placing road signs and applying measures to ensure traffic safety on various routes;
- Agricultural, irrigation, fishery, salt-making and forestry non-business activities: consolidation and maintenance of dyke systems, irrigation works, agricultural, forestry and fishery farms and stations; forestry, agricultural and fishery promotion work; zoning off for aquaculture, forest protection. forest fire prevention and fighting, aquatic resource protection;
- Municipal administration non-business activities: consolidation and maintenance of public-lighting systems, street sidewalks, water supply and drainage systems, intra-municipal traffic, parks and other municipal administration non-business activities;
- Making cadastral measurement and maps and archiving cadastral dossiers, and other cadastral non-business activities;
- Basic surveys;
- Environment-related non-business activities;
- Other economic non-business activities.

- c) Defense, security, social order and safety tasks financed by the local budgets under the Government's regulations;
 - d) Activities of State bodies, agencies of the Communist Party of Vietnam in localities;
 - e) Activities of the local bodies of the Vietnam Fatherland Front Committee, Vietnam War Veterans' Association, Vietnam Women's Union, Vietnam Peasants' Association, Ho Chi Minh Communist Youth Union;
 - f) Support for political, socio- professional organizations, social organizations and/or socio-professional organizations in localities as provided for by law;
 - g) Implementation of social policies towards subjects under the local management;
 - h) The regular expenditure portions in the national programs implemented by local agencies,
 - i) Price subsidies according to the State's policies;
 - j) Other current expenditures as prescribed bylaw.
3. Expenditures on payment of principals and interests for amounts mobilized for investment as provided for in Clause 3, Article 8 of the State Budget Law.
 4. Expenditures on supplements to the provincial level financial reserve funds.
 5. Expenditures on supplements to low-level budgets.

4 Government Expenditure, Public Debt, and Economic Growth¹

4.1 Introduction

In recent years, many studies have focused on the impact of external debt and public investment on growth (see, for example, Clements et al. 2003, Ejigayehu 2013, Zaman and Arslan 2014, and Bedir and Soydan 2015). Indeed, the question of the impact of public investment on growth and its financing has long divided economists. Following the neoclassical growth theory, the growth rate is determined by capital formulation and, consequently, fiscal policy has a major role (see Peacock and Shaw 1971, Peacock and Wiseman 1979). The neoclassical authors indicated that an increase of tax will raise economic growth. They stated that a lower growth rate may imply a greater consumption net of external diseconomies if the latter (as a share of aggregate production) increases with growth. They also underlined that investment may cause more external-

¹This chapter has circulated as a paper co-written with Phu NGUYEN-VAN, Cuong LE VAN, and Amélie BARBIER-GAUCHARD

ities than current expenditure, in particular, if the latter is related to personal services. Different literatures converge on the same conclusion, i.e. public expenditure promotes economic growth in the short term.

Barro (1990) distinguished two types of government expenditure, productive and unproductive expenditure. He stated that the economy's growth is negatively correlated with the ratio of government spending to GDP and there is a positive relationship between public investment and output growth. In the same vein, Aschauer (1989) found that the government productive expenditure can stimulate output expansion. While Devarajan et al. (1996) agreed that government expenditure has a relationship with economic growth, each component of it has a different effects on growth. Particularly, current expenditure of government is associated with a higher growth whereas government productive expenditure in capital, transport, communication, health, and education have a negative impact on growth. In addition, Devarajan et al. (1996) and Angelopoulos et al. (2007) obtained that economic growth depends not only on the physical production of typical components of public spending, but also on the ratio of government expenditure allocated on them. On the contrary, Mundle (1999) and Glomm and Ravikumar (1997) stated that government spending in infrastructure and social services have a significant impact on the long-run growth rate. Hence, these governments need to shift away from taxes on production and trade to taxes on income, consumption, and value added. In their study about fiscal decentralization, government spending, and economic growth in China, Zhang and Zou (1998) showed that the central government's spending positively impacts economic growth. However, local government spending negatively affects growth. The same finding was also reached by Xie et al. (1999) and Thornton (2007) when the authors studied about the decentralization and economic growth in the United States and in OECD countries, respectively. In contrast to previous studies, using cross-section data for the United States, Akai and Sakata (2002) got a different result following which fiscal decentralization contributes to economic growth.

In a research on growth effects of government expenditure and taxation in developed

countries by using panel data of rich countries for the period 1970-1995, Folster and Henrekson (2001) found a negative relation between public expenditure and economic growth. Easterly and Rebelo (1993) stressed that taxes on international trade have a strong association with economic growth in poor countries whereas income taxes are a main determinant of growth in industrial countries. Furthermore, Gupta et al. (2005) indicated that in low-income countries, the overall composition of public expenditure toward productive uses is particularly important for fostering growth, and that reducing current expenditures tend to trigger higher growth rates than adjustments based on revenue increases and cuts in productive spending. Moreover, reductions in the public sector wage bill are not harmful for economic growth.

Taxation affects not only individuals and firms but also economic growth. Cebula (1995) highlighted that higher maximum levels of federal government personal income tax rate and corporate income tax rate have a negative impact on economic growth, based on an empirical investigation for the period 1955-1972 in the United States. Angelopoulos et al. (2007) found that the average tax rate (as measured by tax revenue over GDP) and the associated fiscal size of the government (as measured by total expenditure over GDP) are significantly and negatively correlated with growth. By using disaggregated taxes, their results indicated (but this is not robust) that the growth effect of effective labor income tax is negative. Similarly, Easterly and Rebelo (1993) addressed that the ratio of tax revenues to GDP has a negative impact on growth, using data on OECD countries for the period 1960-1988. Lastly, the growth effect of effective capital income tax is positive although not significant. However, there is evidence that even through the mix of direct and indirect taxes is an important determinant of long-run growth and investment rates, but in practice, Mendoza and Asea (1997) underlined that plausible changes in tax rates seem to be unlikely to affect growth. Using Harberger model with panel data regression for the period 1965-1991 in 11 OECD countries, the authors found that the effects of 10 percentage point tax cuts on the investment rate are about 0.5 and 1.5 percentage points but growth effects are very small, approximately 0.1 to 0.2 of a percentage point. Mullen and Williams (1994)

obtained that higher marginal tax rates are associated with a slower output growth and that lower marginal tax rates are able to have a positive impact on economic growth. The results of Mullen and Williams (1994) mean that changes in effective tax rates have an important effect on economic growth and that average tax rates and growth constitutes a significant relationship. In a non-stochastic model, Lee et al. (1997) showed that tax significantly affects growth and a tax cut rises the economy's growth rate. However, if consumers are risk averse enough, the growth rate might be decreased with a tax cut. Furthermore, Kim (1998) supposed that tax systems across countries have a significant relation with growth in which differences in taxes can explain growth discrepancy. The author also stated that tax reform may influence economic growth and that the hypothetical elimination of all taxes in the US raises approximately 0.85 percentage points of growth rate in the calibrated model. Lin and Russo (1999) found different figures with Kim (1998). For instance, there would be an increase in the growth rate by 0.63 percentage points if all the income taxes were eliminated and US debt-to-capital ratio was about 33%. When the corporate tax for innovative companies is eliminated, the growth rate will decrease by 0.20 percentage points.

By analyzing taxation and growth in an overlapping generations model, Yakita (2003) showed that the flat-rate wage tax elevates the growth rate and the flat-rate income tax does not stimulate economic growth. These results are different with Lucas' (1986) findings that labor income taxes stimulate economic growth while capital taxes do not. In their research, Lee and Gordon (2005) concluded that corporate tax rates have a negative impact on economic growth (i.e. a cut in corporate tax rate by 10% will raise economic growth from 1% to 2%) whereas the personal tax rates have no clear evidence. Angelopoulos et al. (2007) recognized that some kinds of taxes such as labor income tax are negatively related to growth, meanwhile capital income and corporate income taxes are positively related to growth.

Regarding public debt, Greiner (2007) assumed that the ratio of primary surplus to gross domestic income is a positive linear function of the debt to gross domestic debt ratio. The author also stated that a sustainable balanced growth path exists if

the government uses a certain part of the tax revenue for the debt services. In other researches, Reinhart and Rogoff (2010) and Herndon et al. (2014) showed that public debt has a positive impact on economic growth and there is a higher ratio of public debt to GDP leads to a lower GDP growth rate. For instance, if the ratio of public debt to GDP is lower than 30%, the average GDP growth rate is about 4.1%. On the contrary, the growth rate is reduced to 2.2% if the ratio of public debt to GDP becomes larger than 90%. In a study on the role of government debt on economic growth across twelve Euro-area countries, Checherita and Rother (2010) found that public debt and economic growth have a nonlinear relation and that a higher public debt-to-GDP ratio is on average associated with a lower long-term growth rate when debt is above the range of 90-100% of GDP. In practice, the ratio of public debt to GDP in each country is different, for example, in European countries where it is regulated at the level of 60% of GDP following the Maastricht criteria. In the case of developing countries such as Vietnam, the figure is 65%.

Clements et al. (2003) stressed that high levels of public debt can depress economic growth in low-income countries and the corresponding threshold level of external debt is estimated around 50% of GDP in their simulation exercise. In the same vein, according to Ejigayehu (2013), Zaman and Arslan (2014), and Soydan and Bedir (2015), the empirical results generally reveal that the accumulation of external debt is associated with an increase in economic growth up to an optimal level, and an additional increase of external indebtedness beyond the level has inversely contributed to the economy. In other words, there exists a threshold above which a too high level of external debt has a negative effect on growth.

In this chapter, we consider a growth model that includes the issues underlined above, i.e. we investigate the relation between growth, public investment, tax on returns to assets, and public debt. Our study distinguishes two types of public debt, domestic debt and external debt, whereas most of existing theoretical works only considered domestic debt (e.g. Battaglini and Coate 2008, Greiner, 2007, Elmendorf and Mankiw 1999, among others). We study the balanced growth path of the model and focus on the

impact of the tax rate on returns to private assets on the macroeconomic equilibrium.²

The remaining of the chapter is organized as follows. The theoretical model, based on Barro (1990) and Greiner (2007), is introduced in Section 4.2. Section 4.3 presents the equilibrium of the model while Section 4.4 characterizes the balanced growth path (BGP) of the economy. The effects of tax on returns to assets on the steady state of the economy is analyzed in Section 4.5. The last section concludes the study.

4.2 Model

The growth model presented in this section is based on the models developed by Barro (1990) and Greiner (2007). Our economy comprises three sectors, namely government, firms, and consumers.

4.2.1 Government

We assume that at each period t the government can collect tax on returns to assets held by private agents. It can also borrow from the domestic and international financial markets, which correspond to two types of public debt, domestic debt D_t with interest rate r_t^D and external debt B_t with interest rate r_t^B . As the country has no power on the international financial market, $\{r_t^B\}_{t=0}^{\infty}$ is a sequence of exogenous external interest rates. On the spending side, the government can share its resources between public expenditure devoted to production of final goods and reimbursement of interests and capital of domestic and external debts.³

²We only focus on the effect of tax on returns to assets on the decentralized equilibrium in the presence of two types of public debt (domestic debt and external debt). We do not discuss the welfare aspect and, in particular, how the tax rate can be set in order to maximize welfare. This issue as well as the optimal growth (from the central planner's viewpoint) are obviously very important and deserve to be investigated in a further study.

³Recall that we distinguish two types of public debt, domestic debt and external debt, whereas most of existing theoretical studies only considered domestic debt (e.g. Battaglini and Coate 2008, Greiner, 2007, Elmendorf and Mankiw 1999, among others).

The government budget constraint can be expressed as follows:⁴

$$G_t + (r_t^B + 1)B_t + (r_t^D + 1)D_t = \tau_t r_t^A A_t + B_{t+1} + D_{t+1}. \quad (4.1)$$

where A_t is the stock of assets held by private agents, τ_t is the tax rate on returns to assets, r_t^A is the interest rate of asset, and G_t is the flow of government expenditure.

Following Greiner (2007), we assume that public debt is not over a certain proportion of total output in order to guarantee sustainability of public debt:

$$G_t + \eta(B_t + D_t) \leq \phi Y_t + \tau_t r_t^A A_t, \quad (4.2)$$

with ϕ and $\eta \in \mathbb{R}_+$ are constants. Parameter ϕ determines whether the level of the primary surplus rises or falls with an increase in gross domestic income, η determines how strong the primary surplus reacts to changes in domestic debt and external debt, η may be considered as a feedback parameter of domestic debt and external debt.

Inequality (4.2) means that total government expenditure and government's borrowing are not exceeded government's revenue which comes from tax collection and a certain proportion of total output. Equation (2) can be also rewritten as

$$G_t - \tau_t r_t^A A_t + \eta(B_t + D_t) \leq \phi Y_t.$$

This condition means that budget deficit ($G_t - \tau_t r_t^A A_t$) can be financed by domestic and external debt, which can be covered by a proportion of production. This condition is motivated by some empirical facts through the Maastricht criteria (public debt lower than 60% of GDP, budget deficit is lower than 3% of GDP), threshold of public debt set in some developing countries (such as in Vietnam where the threshold is 65% of GDP), and the discussion about the relation between public debt and growth since the seminal paper of Reinhart and Rogoff (2010).

⁴All variables are expressed in terms of real values.

Let r_{t-1}^{BD} denote the interest rate which satisfies:

$$B_{t-1}r_{t-1}^B + D_{t-1}r_{t-1}^D = (B_{t-1} + D_{t-1})r_{t-1}^{BD} \quad (4.3)$$

or equivalently,

$$r_t^{BD} = \frac{B_t}{B_t + D_t}r_t^B + \frac{D_t}{B_t + D_t}r_t^D. \quad (4.4)$$

Equation (4.4) indicates that r_{t-1}^{BD} is an average interest rate of r_{t-1}^B and r_{t-1}^D . There always exists an interest rate r_{t-1}^{BD} with given $r_{t-1}^B, r_{t-1}^D, B_{t-1}$ and D_{t-1} . Equation (4.3) can be rewritten as follows:

$$B_{t-1}(1 + r_{t-1}^B - \eta) + D_{t-1}(1 + r_{t-1}^D - \eta) = (B_{t-1} + D_{t-1})(1 + r_{t-1}^{BD} - \eta). \quad (4.5)$$

At equilibrium, condition (4.2) must bind. Together (4.1), (4.2) and (4.3) lead to

$$B_t + D_t = (B_{t-1} + D_{t-1})(1 + r_{t-1}^{BD} - \eta) + \phi Y_{t-1}. \quad (4.6)$$

We now look at the sustainability of public debt. Following Greiner's (2007) terms, sustainability of public debt states that the current value of public debt must equal the sum of discounted future non-interest surpluses. The sufficient condition for the sustainability of public debt is summarized in the following proposition.

Proposition 1 *Define that γ_t is growth rate of gross domestic income Y_t , and r_t^{BD} is determined by equation (4.4). The sufficient condition for the sustainability of public debt is $\max\{\sup_t \gamma_t, 0\} < \inf_t r_t^{BD} - \eta$.*

Proof. Equation (4.6) can be expressed as follows (using equation (4.5)):

$$B_t + D_t = (B_0 + D_0) \prod_{j=1}^t (1 + r_{t-j}^{BD} - \eta) + \sum_{s=1}^t \phi Y_{t-s} \prod_{j=1}^{s-1} (1 + r_{t-j}^{BD} - \eta), \quad (4.7)$$

which is equivalent to

$$B_0 + D_0 = \frac{B_t + D_t}{\prod_{j=1}^t (1 + r_{t-j}^{BD} - \eta)} - \frac{\sum_{s=1}^t \phi Y_{t-s} \prod_{j=1}^{s-1} (1 + r_{t-j}^{BD} - \eta)}{\prod_{j=1}^t (1 + r_{t-j}^{BD} - \eta)}. \quad (4.8)$$

Sustainability of public debt is characterized by

$$B_0 + D_0 = \lim_{t \rightarrow \infty} \left(\frac{B_t + D_t}{\prod_{j=1}^t (1 + r_{t-j}^{BD} - \eta)} \right). \quad (4.9)$$

Condition (4.9) is verified if

$$\lim_{t \rightarrow \infty} \frac{\sum_{s=1}^t \phi Y_{t-s} \prod_{j=1}^{s-1} (1 + r_{t-j}^{BD} - \eta)}{\prod_{j=1}^t (1 + r_{t-j}^{BD} - \eta)} = 0. \quad (4.10)$$

Denote that γ_t is the growth rate of total production income Y_t . Hence, $Y_{t-s} = \prod_{j=0}^{t-s} (1 + \gamma_j) Y_0$. We then get

$$\begin{aligned} \frac{\sum_{s=1}^t \phi Y_{t-s} \prod_{j=1}^{s-1} (1 + r_{t-j}^{BD} - \eta)}{\prod_{j=1}^t (1 + r_{t-j}^{BD} - \eta)} &= \phi Y_0 \frac{\sum_{s=1}^t \prod_{j=0}^{t-s} (1 + \gamma_j) \prod_{j=1}^{s-1} (1 + r_{t-j}^{BD} - \eta)}{\prod_{j=1}^t (1 + r_{t-j}^{BD} - \eta)} \\ &= \phi Y_0 \sum_{j=1}^t \prod_{s=j}^t \left(\frac{1 + \gamma_{t-s}}{1 + r_{t-s}^{BD} - \eta} \right) \end{aligned}$$

Hence, if $\max\{\sup_t \gamma_t, 0\} < \inf_t r_t^{BD} - \eta$ then condition (4.9) is verified. ■

As our model has domestic debt and external debt, sustainability of debt means that in the long run the discounted value of the sum of two debts cannot exceed the initial total debt (or in other words, current value of public debt must equal the sum of discounted future non-interest surpluses) given in equation (4.9), which holds if equation (4.10) is satisfied. This corresponds to the No-Ponzi-Game (NPG) condition for our model. For the Ramsey growth model with (only domestic) public debt, the NPG condition can be found in Heijdra and Van Der Ploeg (2002).

For our model, the NPG condition is satisfied if $\max\{\sup_t \gamma_t, 0\} < \inf_t r_t^{BD} - \eta$. In other words, output growth rate γ_t should be sufficiently lower than the average interest

rate r_t^{BD} . If output growth rate is higher than $r_t^{BD} - \eta$, in this case the expression in (4.10) will tend to infinity and, consequently, the right-hand side term of equation (4.8) will converge to minus infinity, implying that the initial total debt cannot be covered (i.e. debt is not sustainable).

4.2.2 Firms

We assume that the production of the final good depends on the stock of private capital and government spending:

$$Y_t = F(K_t, G_t) = HK_t^\alpha G_t^{1-\alpha} \quad (4.11)$$

where $0 < \alpha < 1$ is output elasticity with respect to capital (and $1 - \alpha$ is the elasticity corresponding to public spending), H is total factor productivity or technological level. The production function F is strictly increasing in both variables, strictly concave in K . The production function also verifies (i) $F(0, G) = 0$ and (ii) $F(K, 0) > 0$ if $K > 0$. Here, G may be considered as a positive externality for the production. The profit is given by $\pi_t = F(K_t, G_t) - r_t^K K_t$ (r_t^K is the interest rate of capital). The first-order condition (FOC) for profit maximization is

$$F'_K(K_t, G_t) = r_t^K. \quad (4.12)$$

By substituting equation (6.4) into equation (4.12), the interest rate of capital can be written as

$$r_t^K = \alpha HK_t^{\alpha-1} G_t^{1-\alpha} = \alpha H \left(\frac{G_t}{K_t} \right)^{1-\alpha}, \quad (4.13)$$

or, equivalently,

$$r_t^K = \alpha H g_t^{1-\alpha}, \quad (4.14)$$

where $g_t \equiv G_t/K_t$. Equation (4.13) implies that interest rate of private capital is determined by total factor productivity, output elasticity with respect to public spending,

and the ratio of government expenditure and private capital.

4.2.3 Consumers

The representative consumer's instantaneous utility function is assumed to have the iso-elastic form

$$U(C_t) = \begin{cases} \frac{C_t^{1-\rho}-1}{1-\rho} & \text{if } \rho \neq 1 \\ \ln C_t & \text{if } \rho = 1 \end{cases} \quad (4.15)$$

where $\rho > 0$ is the intertemporal elasticity of substitution. The representative consumer chooses her consumption, her stock of assets, and her government bonds to maximize her inter-temporal utility $\sum_{t=0}^{+\infty} \beta^t U(C_t)$, where $\beta > 0$ is the discount rate, under the budget constraint

$$C_t + A_{t+1} + D_{t+1} \leq [r_t^A(1 - \tau_t) + 1] A_t + (r_t^D + 1)D_t + \pi_t \quad (4.16)$$

and positivity constraints $C_t \geq 0$ and $A_t \geq 0$, $\forall t$. Note that C_t , A_t , D_t , and π_t are respectively consumption, private assets, domestic debt hold by the consumer, and the profit she receives as the firm owner.⁵

The Lagrangian is

$$L = \sum_{t=0}^{\infty} \beta^t U(C_t) - \sum_{t=0}^{\infty} \lambda_t \{ [r_t^A(1 - \tau_t) + 1] A_t + (r_t^D + 1)D_t + \pi_t - C_t - A_{t+1} - D_{t+1} \} + \sum_{t=1}^{\infty} \mu_t A_t.$$

⁵We assume that there is no tax on government bond interest. Indeed, when such a tax exists, the consumer's budget constraint will include the term $r_t^D(1 - \tau_t^D)D_t$ instead of $r_t^D D_t$. In this case, the non-arbitrage condition between private assets and government bonds is $r_t^A(1 - \tau_t^A) = r_t^D(1 - \tau_t^D)$, which implies $r_t^A = r_t^D$ and $\tau_t^A = \tau_t^D$. For simplification purpose, we do not impose any tax on government bonds and consequently the implied non-arbitrage condition (see also below) will become equation (4.21).

The FOCs are given as follows, $\forall t$,

$$\beta^t U'(C_t) + \lambda_t = 0, \quad (4.17)$$

$$\lambda_t [(1 + r_t^A(1 - \tau_t))] - \lambda_{t-1} - \mu_t = 0, \quad (4.18)$$

$$\lambda_t(1 + r_t^D) - \lambda_{t-1} = 0, \quad (4.19)$$

$$\mu_t A_t = 0. \quad (4.20)$$

The slackness condition in (6.19) means that $A_t > 0$, $\mu_t = 0$ or $A_t = 0$, $\mu_t > 0$. These FOCs and the budget constraint will provide a solution of the consumer's optimization program.

Solving for an interior solution ($A_t > 0$), conditions (4.18)-(6.19) give:

$$r_t^D = r_t^A(1 - \tau_t). \quad (4.21)$$

The equality between the interest rate of domestic debt and the net interest rate of private asset given in (4.21) represents the non-arbitrage condition between holding domestic debt and holding private capital. Furthermore, conditions (4.17) and (4.19) give

$$\frac{U'(C_{t-1})}{U'(C_t)} = \beta(1 + r_t^D), \quad (4.22)$$

which is the usual Keynes-Ramsey rule which states that the marginal utility of past consumption is equal to the discounted marginal utility of current consumption times the interest rate.

By using the utility function in (4.15), equation (4.22) becomes

$$\frac{C_t}{C_{t-1}} = [\beta(1 + r_t^D)]^{1/\rho}. \quad (4.23)$$

4.3 Equilibrium

Equilibrium of model is a solution of the following equations:

Balancedness of the government budget:

$$G_t + r_t^B B_t + r_t^D D_t + B_t + D_t = r_t^A \tau_t K_t + B_{t+1} + D_{t+1}$$

Sustainability of debt condition:

$$G_t + \eta(B_t + D_t) = \phi Y_t + \tau_t r_t^A A_t.$$

Balancedness of consumer budget:

$$C_t + A_{t+1} + D_{t+1} = [r_t^A(1 - \tau_t) + 1] A_t + (r_t^D + 1)D_t + \pi_t.$$

Keynes-Ramsey rule:

$$\frac{U'(C_{t-1})}{U'(C_t)} = \beta(1 + r_t^D).$$

Market clearing for the capital:

$$K_t = A_t$$

Market clearing for the aggregate good:

$$C_t + K_{t+1} = F(K_t, G_t) + K_t.$$

Market clearing for the domestic debt:

$$D_{t+1} + \tau_t r_t^K K_t = (1 + r_t^D)D_t.$$

And interest rates of capital and domestic debt:

$$\begin{aligned} r_t^K &= F'_K(K_t, G_t), \\ r_t^D &= r_t^A(1 - \tau_t). \end{aligned}$$

The equilibrium must also satisfy the NPG condition (for the sustainability of public

debt) in Proposition 1 (i.e. $\max\{\sup_t \gamma_t, 0\} < \inf_t r_t^{BD} - \eta$) and the transversality condition $\lim_{t \rightarrow \infty} \beta^t K_t = 0$.⁶

4.4 Balanced growth path

Let us define $g_t \equiv \frac{G_t}{K_t}$, $b_t \equiv \frac{B_t}{K_t}$, $d_t \equiv \frac{D_t}{K_t}$, $c_t \equiv \frac{C_t}{K_t}$, $\xi_c \equiv \frac{C_{t+1}}{C_t}$, $\xi_b \equiv \frac{B_{t+1}}{B_t}$, $\xi_d \equiv \frac{D_{t+1}}{D_t}$, and $\xi_k \equiv \frac{K_{t+1}}{K_t}$. The solution for the model with the variables G_t , C_t , B_t , D_t , and K_t is equivalent to the solution with new variables g_t , c_t , b_t , and d_t . Equations (4.1), (4.2), (4.16), (4.23), and the good market clearing condition become

$$g_t + (1 + r_t^B)b_t + (1 + r_t^D)d_t = r_t^K \tau_t + (b_{t+1} + d_{t+1})\xi_k, \quad (4.24)$$

$$\tau_t r_t^K - g_t = \phi H g_t^{1-\alpha} + \eta(b_t + d_t), \quad (4.25)$$

$$\frac{c_{t+1}}{c_t} \xi_k = [\beta(1 + r_t^D)]^{1/\rho}, \quad (4.26)$$

$$c_t + \xi_k + d_{t+1}\xi_k = (1 - \tau_t)r_t^K + 1 + (1 + r_t^D)d_t, \quad (4.27)$$

with $\xi_k = H g_t^{1-\alpha} + 1 - c_t$.

By substituting equation (4.13) into equations (4.24)-(4.27) and by using the non arbitrage condition (4.21), we get the following system

$$g_t + (1 + r_t^B)b_t + [1 + (1 - \tau_t)\alpha H g_t^{1-\alpha}] d_t = \alpha H g_t^{1-\alpha} \tau_t + (b_{t+1} + d_{t+1})(H g_t^{1-\alpha} + 1) \quad (4.28)$$

$$\tau_t \alpha H g_t^{1-\alpha} - g_t = \phi H g_t^{1-\alpha} + \eta(b_t + d_t), \quad (4.29)$$

$$\frac{c_{t+1}}{c_t} (H g_t^{1-\alpha} + 1 - c_t) = [\beta(1 + (1 - \tau_t)\alpha H g_t^{1-\alpha})]^{1/\rho}, \quad (4.30)$$

$$c_t + (1 + d_{t+1})(H g_t^{1-\alpha} + 1 - c_t) = [1 + (1 - \tau_t)\alpha H g_t^{1-\alpha}] (1 + d_t). \quad (4.31)$$

A balanced growth path equilibrium is defined by $x_{t+1} = x_t = x^*$, $x = c, b, d, g$. The

⁶It should be noted that the model includes three predetermined variables (K, B, D) and one non-predetermined variable (C).

BGP is hence given by the following quantities:

$$g^* = \left(\frac{1 - \beta}{\beta(1 - \tau)\alpha H} \right)^{\frac{1}{1-\alpha}}, \quad (4.32)$$

$$c^* = \frac{1 - \beta}{\beta(1 - \tau)\alpha}, \quad (4.33)$$

$$d^* = \frac{1 - \alpha(1 - \tau)}{\alpha(1 - \tau)}, \quad (4.34)$$

$$b^* = \frac{1}{\eta} \left[\frac{(1 - \beta)\tau}{\beta(1 - \tau)} - \left(\frac{1 - \beta}{\beta(1 - \tau)\alpha H} \right)^{\frac{1}{1-\alpha}} - \frac{(1 - \beta)\phi}{\beta(1 - \tau)\alpha} - \eta \frac{1 - \alpha(1 - \tau)}{\alpha(1 - \tau)} \right], \quad (4.35)$$

and the following interest rates

$$r^{D*} = \frac{1 - \beta}{\beta}, \quad (4.36)$$

$$r^{K*} = \frac{1 - \beta}{\beta(1 - \tau)}. \quad (4.37)$$

The results show that the ratios of government expenditure, consumption, and domestic debt over private capital at the BGP depend on parameters such as tax rate (τ), discount rate (β), output elasticities (α and $1 - \alpha$), and technological level (H). In addition to these parameters, the BGP value of the ratio of external debt to capital also depend on the slopes of the budget surplus function with respect to output (ϕ) and total public debt (η). Furthermore, we observe that the interest rates of domestic debt and private capital at the BGP are determined only by the consumer's discount rate and the tax rate on returns to assets. At the BGP, tax rate has an impact on almost of all macroeconomic variables while it does not affect interest rate of domestic debt which is determined only by discount rate (β). It is easy to find that the relationship between interest rate of domestic debt (r^{D*}) and discounted rate (β) is negative because of negative derivative of the interest rate of domestic debt with respect to discount rate. In the next section, we will investigate the impact of tax rate on the rest of macroeconomic variables.

4.5 Impact of taxation on economy

The impacts of the tax rate on returns to assets on the macroeconomic variables of the model (government expenditure, consumption, domestic debt, external debt, and interest rate of capital) can be summarized in the following proposition.

Proposition 2 *Other things being equal,*

(i) g^* , c^* , d^* , and r^{K^*} increase with τ ,

(ii) a) If $\alpha \leq \frac{\eta\beta}{1-\beta} + \phi$, b^* decreases with τ ,

b) If $\alpha > \frac{\eta\beta}{1-\beta} + \phi$, b^* increases with τ if $\tau < \bar{\tau}$ and decreases with τ if $\tau \geq \bar{\tau}$,
where

$$\bar{\tau} \equiv 1 - \frac{\left(\frac{1-\beta}{\alpha\beta H}\right)^{\frac{1}{\alpha}}}{\left[\left(\frac{1-\beta}{\beta}(\alpha - \phi) - \eta\right)\frac{1-\alpha}{\alpha}\right]^{\frac{1}{\alpha}}}. \quad (4.38)$$

Proof. The derivatives of g^* , c^* , d^* , b^* with respect to τ can be obtained from equations (4.32)- (4.35) and (4.37):

$$\frac{\partial g^*}{\partial \tau} = \frac{1}{(1-\alpha)(1-\tau)^2} \left(\frac{1-\beta}{\alpha\beta H}\right)^{\frac{1}{1-\alpha}} \left(\frac{1}{1-\tau}\right)^{\frac{\alpha}{1-\alpha}} \geq 0, \quad (4.39)$$

$$\frac{\partial c^*}{\partial \tau} = \frac{1-\beta}{\alpha\beta(1-\tau)^2} \geq 0, \quad (4.40)$$

$$\frac{\partial d^*}{\partial \tau} = \frac{1}{\alpha(1-\tau)^2} \geq 0, \quad (4.41)$$

$$\frac{\partial b^*}{\partial \tau} = \frac{1}{\eta(1-\tau)^2} \left[\frac{(1-\beta)(\alpha - \phi) - \eta\beta}{\alpha\beta} - \frac{1}{1-\alpha} \left(\frac{1-\beta}{\alpha\beta H}\right)^{\frac{1}{1-\alpha}} \left(\frac{1}{1-\tau}\right)^{\frac{\alpha}{1-\alpha}} \right] \quad (4.42)$$

$$\frac{\partial r^{K^*}}{\partial \tau} = \frac{1-\beta}{\beta(1-\tau)^2} \geq 0. \quad (4.43)$$

We observe that the derivative of g^* , c^* , d^* , and r^{K^*} with respect to τ as given in equations (4.39), (4.40) and (4.41) are positive because $0 < \alpha, \beta, \tau < 1$, which verify points (i) of the proposition.

Finally, concerning the derivative of b^* with respect to τ , the result is ambiguous. Indeed, from equation (4.42), we can easily check that condition $\alpha \leq \frac{\eta\beta}{1-\beta} + \phi$ sufficiently implies that $\frac{\partial b^*}{\partial \tau} \leq 0$. However, when $\alpha > \frac{\eta\beta}{1-\beta} + \phi$, b^* can either increase or decrease depending on a threshold value of the tax rate. The latter is obtained after some arithmetic manipulation as

$$\bar{\tau} \equiv 1 - \frac{\left(\frac{1-\beta}{\alpha\beta H}\right)^{\frac{1}{\alpha}}}{\left[\left(\frac{1-\beta}{\beta}(\alpha - \phi) - \eta\right) \frac{1-\alpha}{\alpha}\right]^{\frac{1-\alpha}{\alpha}}}.$$

As a result, in the case of $\alpha > \frac{\eta\beta}{1-\beta} + \phi$, external debt increases with τ if τ is lower than this threshold and decreases if τ is higher. This verifies point (ii.b) of the proposition.

■

This result means that at the steady state if tax rate τ increases, government expenditure g^* , consumption c^* , domestic debt d^* , and interest rate on private assets r^{K^*} increase. In other words, an increase in tax rate on returns to assets boosts government expenditure, consumption, domestic debt, and interest rate on capital. Indeed, an increase of the tax rate on returns to private assets (or capital) implies a reallocation of the household income in favor of government bond (or domestic debt, d^*) to the detriment of private assets. However, this tax increase will raise interest rate on private assets (r^{K^*}), which in turn makes private assets more attractive than government bond. The positive effect on government bond dominates the negative one, leading to an increase of government bond at the steady state.

Regarding government expenditure, a tax increase raises interest rate r^{K^*} and then the quantity associated to tax revenue (τr^{K^*}), which fosters government expenditure (according to the government budget constraint).

Concerning consumption, an increase of tax rate on returns to private assets diminishes total available income. Consequently, the consumer reallocates her income in favor of consumption (c^*). However, this tax increase makes capital more attractive than consumption as a consequence of a rise of interest on private assets. It results

in a higher output as both private capital and public expenditure rise after a tax increase. The positive effect on consumption dominates the negative one, resulting in an expansion of consumption with respect to tax rate at the steady-state.

In terms of impact of tax rate on external debt, if the productivity of physical capital (α) is too small or the ratio of debt to GDP (ϕ) and the feedback parameter of public debt (η) are large, external debt decreases with the tax rate. This result explains that when the productivity of capital is small enough (or the debt ratio and the feedback parameter are sufficiently large), a tax increase generates a higher difficulty to the government to borrow money from international financial markets (i.e. negative relation between b^* and τ). However, if the productivity of capital is sufficiently high (or the debt ratio and the feedback parameter are sufficiently small), external debt rises if the tax rate is lower than a certain threshold and it diminishes when tax rate is larger than this threshold. This gives rise to a bell-shaped form relation between external debt and tax rate in the case of high productivity of capital. Obviously, in this situation, an increase of tax rate (when it is still low enough) is well supported by the economy and external debt rises. On the contrary, when the tax rate is at a too high level, it becomes harmful for the economy as the payment ability of the government becomes lower and then it is too hard to borrow from international financial markets.

4.6 Conclusion

In this chapter, we investigate the relationship between government expenditure, tax on asset returns, economic growth, and public debt. The main message of the chapter, which considers both domestic and external debt in a Barro growth model, resides in Proposition 2. In particular, the chapter shows that an increase of tax on returns to assets can positively impact the steady-state values of main macroeconomic variables expressed in ratios of physical capital (consumption, public expenditure, domestic debt). This result is consistent with Greiner (2007) in the case of income tax and Angelopoulos et al. (2007) when capital income tax is considered.

Regarding external debt, the analysis underlines the key role of three parameters: the productivity of private capital, the size of public debt ratio, and the feedback parameter of public debt. The relation between external debt and tax rate at the steady state depends on the relative values of these three parameters. If the productivity of physical capital is small or the ratio of debt is large (or the feedback parameter of public debt is large), the effect of taxation is negative. As the situation of low productivity usually arises in poor countries where governments control almost of economic activities, we can expect that an increase in tax rate leads to a reduction in external debt (similarly to the finding of Greiner 2007 in the case of income tax). On the opposite, in case of high productivity of capital (often observed in developed countries), an increase in tax rate can boost external debt as long as tax rate does not exceed a certain threshold, otherwise, the relation is decreasing.

These findings also have some implications for other developing countries and transition economies pursuing economic growth and fiscal policy in order to manage the threshold of public debt. The government can use the fiscal instrument to conduct economic development as well as manage the threshold of external debt and domestic debt.

5 Government Expenditure, Productivity, and Economic Growth of Vietnam's Provinces¹

5.1 Introduction

Vietnam, a one-party communist country, initiated a vast economic reform program in 1986 (known as 'Doi Moi' in Vietnamese) to transform its planned economy into a socialist-oriented market economy. Since then, the Vietnam's economy has been recognized as one of the most dynamic emerging economy in the world. It has a long lasting and rapid growth over the last three decades. In this context, two major issues have intrigued both academic researchers and policy observers. On the one hand, the public sector always keeps an utmost importance during the industrialization and modernization of the Vietnam's economy. Public expenditure at the national and local levels, regardless of its categories (investment, education spending, health spending, etc.), is considered as a key factor for this economic take-off. This feature seems to go to the op-

¹This chapter has circulated as a paper co-written with Phu NGUYEN VAN and Kim Cuong PHAM THI

posite direction of the Washington Consensus which recommended several countries (in particular in Latin America and Africa in the 80s) to implement a higher deregulation and a rapid privatization (Williamson, 1990). On the other hand, the decentralization, one pillar of this reform devolving larger competencies and responsibilities to the provinces, implies a greater competition among provinces.² Although many State efforts have been made to correct economic disparity among provinces, the phenomenon still remains important. It is generally admitted that the locomotive of the Vietnamese economy is Ho Chi Minh City, its neighboring provinces, and in a lesser extent the capital Ha Noi.

Regarding national and local public expenditure, Figure 5.1 displays the rising dynamics of national GDP and median values of provincial GDP over period 2000-2007 (both in 2010 prices). National and local public expenditure (in terms of public investment, also in 2010 prices) in Vietnam also increases during the same period of observation. Figure 5.2 displays the evolution of these series over period 2000-2007. For local public spending, the plot shows the median values computed yearly for Vietnam's provinces.

Concerning the competition between provinces, the Vietnam Provincial Competitiveness Index has been constructed to measure and rank the economic governance at the provincial level in relation with private sector development (Malesky et al., 2015).³ The top 5 provinces following this index in 2007 are Binh Duong (top), Da Nang, Vinh Long, Binh Dinh, and Lao Cai (Vung Tau and Ho Chi Minh City are respectively in the 8th and the 10th position) while the bottom five are Bac Lieu, Dien Bien, Cao Bang, Lai Chau and Dak Nong (the last position). The ranking in 2014 shows that the top ten provinces are Da Nang (top), Dong Thap, Lao Cai, Ho Chi Minh City, and Quang Ninh whereas the bottom five are Bac Kan, Ha Giang, Cao Bang, Lai Chau, and Dien

²Vietnam was consequently viewed as a relatively highly decentralized country (World Bank, 2014).

³The Vietnam Provincial Competitiveness Index (PCI) is administered by the Vietnam Chamber of Commerce and Industry (VCCI) with support from the U.S. Agency for International Development (USAID). It is built on the opinions of domestic non-state firms from all 63 provinces and foreign-invested ones operating in Vietnam. The PCI aims to assess and rank the provincial economic governance that can affect private sector development.

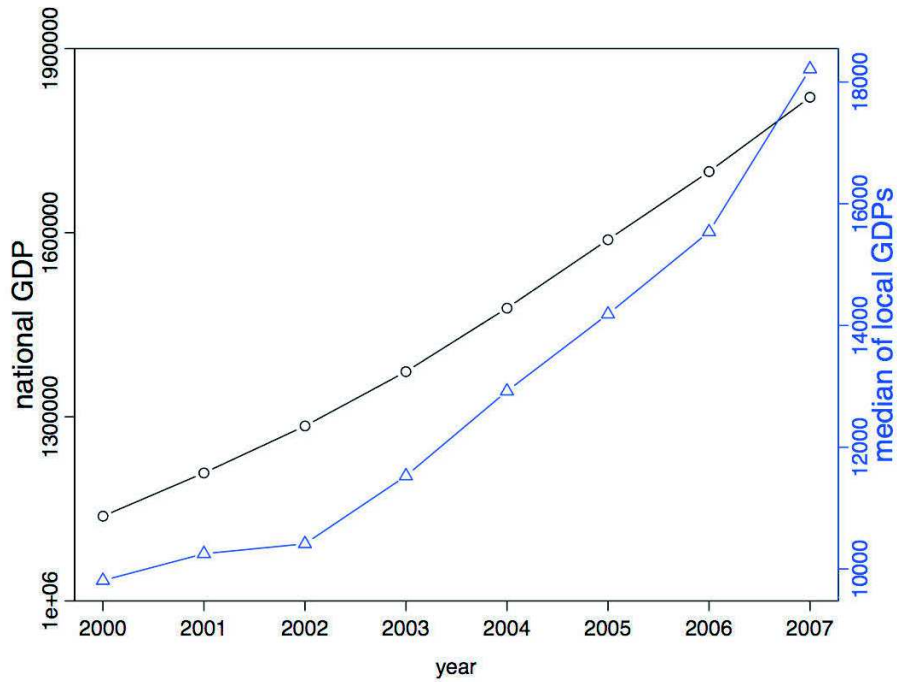


Figure 5.1: National GDP and median GDP of Vietnam's provinces. The left y -axis corresponds to national GDP (\circ symbol). The right y -axis corresponds to the median local GDP (\triangle symbol). Data sources: World Development Indicators (World Bank), General Statistics Office (Vietnam), and Ministry of Finance (Vietnam).

Bien (all of them are at the northern border).

In terms of observed data on foreign direct investment at the provincial level, we note that the top five provinces which received the highest foreign direct investment in 2000 (measured in 2010 prices) are Ho Chi Minh City, Binh Duong, Bac Lieu, Dong Nai (all of them are in the South), and the capital Ha Noi (in the North) whereas the five provinces which received the least foreign investment are Ha Nam, Nam Dinh, Dien Bien (in the North), Dak Nong (Central Highlands), and Ninh Thuan (Center). In 2007, the top five are almost the same with the exception that Bac Lieu is replaced by Vung Tau (a neighboring province of Ho Chi Minh City). For the same year, the bottom five are Bac Kan (in the North), Quang Binh (Center), Bac Lieu, Tra Vinh, and An Giang (all in the South).

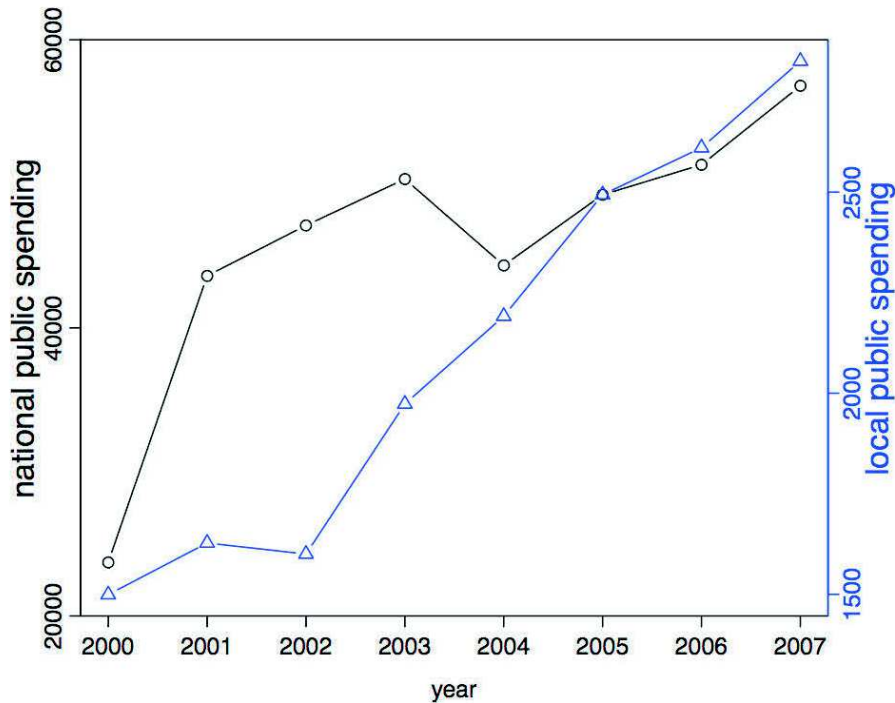


Figure 5.2: National and provincial public spending. The left y -axis corresponds to national public spending (\circ symbol). The right y -axis corresponds to median values of provincial public spending (Δ symbol). Data sources: World Development Indicators (World Bank), General Statistics Office (Vietnam), and Ministry of Finance (Vietnam).

It also appears that only the provincial economic governance, represented by the PCI, does not entirely capture the dynamics of foreign direct investment in Vietnam's provinces. Comparing the lists of provinces above, we find that top provinces receiving FDI do not always coincide with top provinces having the highest PCI values. We hypothesize that an analysis of the distribution of provincial productivity can help us to explain this phenomenon.

This chapter aims to investigate whether the underlying dynamics of local and national public expenditure in Vietnam can have any impact on the local economies, in terms of growth and productivity. Another objective is to assess the difference among Vietnam's provinces in terms of their productivity. Such a study has not been

done so far, probably due to the lack of reliable data. We investigate the impact of public expenditure on productivity of Vietnam's provinces by distinguishing two types of public expenditure at the national and the provincial levels. We estimate the role of provincial and national public expenditure in the production process using a data set of 58 Vietnam's provinces over period 2000-2007. We propose a structural modeling to estimate a stochastic production function for these Vietnam's provinces. Our model has an interesting feature which consists of adapting the firm-level approach initiated by Pakes and Olley (1995), Levinsohn and Petrin (2003), and Akerberg et al. (2006) to regional data. A second novel feature is that our model clearly distinguishes three components of TFP: (i) an autonomous technological change, (ii) a deterministic technological change depending on provincial external factors such as human capital and local economy's structure (shares of services, industry, and agriculture in the regional GDP), and (iii) an unobservable (stochastic) technological change. Furthermore, based on the production function estimation, we compute the TFP of Vietnam's provinces and examine its dynamics in order to investigate the long-run distribution of TFP across 58 Vietnam's provinces. Finally, our results are checked by taking into account the endogeneity problem which may be caused by measurement errors in variables.

The main results may be summarized as follows. First, among provincial inputs (physical capital, labor force and public expenditure), only labor force has a positive and significant effect on the output growth of Vietnam's provinces. Neither national nor local public expenditure has a significant effect on productivity. Second, our results show that the share of agriculture and that of services in provincial GDP have negative and significant effects on the productivity of Vietnam's provinces whereas the literacy rate (which is a proxy for human capital) has a positive and significant effect. This finding means that these external factors can explain the cross-provincial differences in terms of TFP and income. Finally, when analyzing the dynamics of TFP, we do not find any evidence of convergence between 58 Vietnam's provinces. The long-run distribution of TFP displays a divergence pattern corresponding to a bipolarization phenomenon where provinces are amassed into two groups, one with high TFP levels and another

with low TFP levels. This bipolar feature provides a plausible explanation of the disparity described above regarding the competition between the Vietnam's provinces.

The remainder of the chapter is organized as follows. In Section 5.2, we present a short literature review on TFP, underlying the role of public expenditure. Section 5.3 presents our proposed structural modeling using a stochastic production function and the potential determinants of TFP for Vietnam's provinces. Section 5.4 presents data and the econometric specification. Estimation results are reported in Sections 5.5. The endogeneity issue related to measurement errors in variables is discussed in Section 5.6. Section 5.7 concludes.

5.2 On overview on public expenditure, productivity and economic growth

The question of whether public expenditure has a significant impact on production and economic growth has been the object of a great deal in the growth literature, notably from the seminal paper of Barro (1990). Barro postulated that for countries with a government size lower than an optimal threshold, public spending has a positive impact on growth, while for countries with a government size higher than that threshold, the impact is negative. Several empirical studies focused on this postulate and the results were mixed. For example, Chamorro-Narvaez (2012) considered the case of Latin America countries over the period 1975-2000 and concluded that neither the stock of government spending nor its current spending has any impact on the growth rate of GDP per capita. Bose et al. (2007) rather indicated a significant influence of capital spending. Using a data set of 15 developing countries, Gregoriou and Ghosh (2007) suggested that the current component of public spending has a positive impact on growth whereas the capital component has a negative effect. This result confirms that of Devarajan et al. (1996) for a larger group of 43 countries over the period 1970-1990.

Several empirical studies underline the influence of public expenditure on the total factor productivity (see, e.g., Aschauer, 1989, Lynde and Richmond, 1993, Hansson and

Henrekson, 1994, Munnell, 1990, Ramirez, 1998, Ascari and Di Cosmo, 2005, Deste-fanis and Sena, 2005, Bronzini and Piselli, 2009, etc.). The findings were divergent, depending on data, econometric methodology, public expenditure categories, etc. For instance, analyzing the labor productivity of the Group of Seven industrialized countries (G-7) over the period 1960-1986, [Aschauer et al. \(1989\)](#) stated that if the share of GDP devoted to public capital accumulation increases by 1%, then labor productivity increases by 0.73%. [Lynde and Richmond \(1993\)](#) explained the American TFP slowdown in the early 1970s by the decline in the public capital-labor ratio. The same argument was advanced by [Munnell \(1990\)](#). This author stressed that besides the fall in the public capital-labor ratio, other factors such as education, rising energy costs, research and development, spending cut, and diversion of funds to pollution abatement are parts of productivity decline in the United States in the early 1970s. [Mastromarco and Zago \(2012\)](#) also concluded that public infrastructure has no significant effect on TFP of Italian manufacturing firms. Moreover, public infrastructure of one region may have a positive effect on the neighboring regions' TFP. This geographical spillover (or externality) from public infrastructure was found across Italian regions during period 1980-2001 by [Bronzini and Piselli \(2009\)](#).

[Bayraktar and Moreno-Dodson \(2012\)](#) underlined that there is no agreement on which components of public spending that can enhance growth. The impact of public spending through its components on economic growth is strong only for countries where there exist fast growth dynamics, a macroeconomic stability, and a strong openness to the private sector. In the same vein, [Baldacci et al. \(2004\)](#) indicated that with the presence of control for governance, both education and health spending promote higher growth in developing countries. [Hansson and Henrekson \(1994\)](#) analyzed the effects of different public expenditure categories in a sample of 14 OECD countries for the 1970-1987 period. Not surprisingly, they found that consumption expenditure and transfers exert a negative influence while educational expenditure has a positive effect on the TFP growth. However, the authors did not find any significant effect of government investment on the TFP growth. This study did not find any nexus between government

spending and the marginal productivity of capital and labor.

It should be noted that the impacts of local and national government expenditure on growth are not necessarily identical. The implementation of policies in infrastructure and human capital by the local government is more likely to foster economic growth. This may be explained by the fact that the central government's policies ignore the geographical difference between regions. Besides, the local government is supposed to be nearer to individual preferences (Oates, 1972, 1993). Empirical findings in Iimi (2005), Thießen (2003), Enikolopov and Zhuravskaya (2007), among others, corroborated this observation. However, in a cross-country study for the period 1970-1989, Davoodi and Zou (1998) found the opposite result. These authors indicated that if the decentralization of expenditure (i.e. local expenditure) increases by 10%, it reduces economic growth by 0.7-0.8% in developing countries. Similarly, using a data on 23 developing countries and for the period 1974-1991, Woller and Phillips (1998) showed no evidence of a significant effect of local expenditure on growth.

At the regional level, Destefanis and Sena (2005) and Ascari and Di Cosmo (2005) also highlighted the role of infrastructure and public capital in explaining the TFP's heterogeneity between Italian regions. Indeed, Ascari and Di Cosmo (2005) concluded that the Italian regions's TFP is mainly determined by research activity, human capital, social capital, infrastructure, and agglomeration spillovers. For the period 1970-1998, Destefanis and Sena (2005) found a positive and significant effect of public capital on the evolution of TFP, particularly in the Italian Southern regions. In another study, Bronzini and Piselli (2009) highlighted significant effects of human capital and neighboring regions' public infrastructure on the long-run TFP across Italian regions over period 1980-2001. This finding corresponds to the existence of a geographical spillover following which an Italian region' productivity benefits from the R&D activity and public infrastructure in its neighboring regions.⁴

⁴At the country level, the international transmission of R&D knowledge may be implemented through the channel of trade and its contribution to TFP growth has been found in several studies (Del Barrio-Castro et al., 2002, Madsen, 2007, etc.). The underlying idea is that one economy's TFP depends on its R&D activity and R&D of foreign economies that spill over into the world economy by

TFP heterogeneity between regions may be found in studies using Chinese data (Chen et al., 2009, Li, 2009, Li and Liu, 2011, among others). For the case of China's regions, one of main element explaining this heterogeneity relates to technological change. Chen et al. (2009) analyzed the dynamics of China's productivity over period 1996-2004 and found out an increase in regional productivity, which is explained by technological change or an adjustment in the production scale. Their analysis also underlined the persistence of productivity inequality between coastal and non-coastal regions. Li (2009) gave the same conclusion concerning the difference in regional productivity for the 1984-2006 period. In addition, the author concluded that TFP growth does considerably contribute to regional economic growth. Using a stochastic frontier model and a decomposition of productivity growth in three components (adjusted scale effect, technological progress and growth of technical efficiency), Li and Liu (2011) estimated the TFP growth of China's regions for the post-reform period (i.e. after 1978). As in Chen et al. (2009), the authors indicated that the major determinant of the TFP growth is technological progress. They recommended the use of a productive investment policy promoting embodied technological change in order to sustain the China's post-reform economy.

Regarding the Vietnam's regions, empirical studies on the relationship between government expenditure, growth and productivity are rare. This is probably due to the lack of reliable data. Anh (2008) analyzed the effects of different components of government expenditure on economic growth for the 2001-2005 period. The author found that investment expenditure has a positive impact on economic growth while current expenditure (such as salary, administration, culture and information, etc.) has no significant impact on economic growth. Minh and Long (2008) indicated that TFP of the Vietnam's economy during the 1985-2006 period was driven by 45.8% by capital, 34.5% by labor, and 19.7% by technological progress. The authors also found that the productivity growth rates of industry, agriculture, and services sectors are 6.3%, 1.6%, and

mean of trade. Trade partners benefit from technological spillovers, which increase their TFP, leading to economic growth. In this regard, the magnitude of international R&D spillovers may depend on human capital of an economy.

-4.7%, respectively. In a recent analysis, Nguyen et al. (2015) applied a spatial econometric approach to investigate the dynamics of industrial labor productivity among 60 provinces over period 1998-2011. The result showed that the spacial dependance among regions, i.e. labor productivity in a province depends on neighboring regions' productivity, affects the labor productivity convergence.

In the next section, we present a structural econometric model to investigate the determinants of output growth and TFP of Vietnam's regions.

5.3 A model for productivity of Vietnam's provinces

5.3.1 Production function

We consider the following stochastic production function of province i ($i = 1, 2, \dots, N$) at year t ($t = 1, 2, \dots, T$):

$$Y_{it} = A_{it}K_{it}^{\alpha}L_{it}^{\beta}G_{it}^{\gamma}\tilde{G}_t^{\theta}\exp(\varepsilon_{it}). \quad (5.1)$$

where Y_{it} , A_{it} , K_{it} , L_{it} , G_{it} are production output, technological level, local private capital, local labor, and local government expenditure available for all provinces at time t , respectively. The error terms ε_{it} represent the unobserved random residuals associated to the production process. Coefficients α , β , and γ correspond to output elasticities of local production factors. Moreover, we do not assume that $\alpha + \beta + \gamma = 1$, i.e. there is not necessarily a constant returns to scale production function.

We also consider the effect of national public spending, such as spending on roads, highways, airports, on the provincial production process. This spending category may be subject to congestion as it is nonexclusive, but partially nonrival. We can then write \tilde{G}_t as:

$$\tilde{G}_t = \frac{G_t}{K_t^{\varphi}L_t^{\psi}}, \quad (5.2)$$

where K_t^{φ} and L_t^{ψ} represent congestion linked to the use of stock of physical capital and labor force at the national level. If $\varphi = \psi = 0$ there is no congestion. In other

words, the parameters φ and ψ represent the degree of non-rivalry of national public spending. The presence of \tilde{G}_t means that national public spending generates a positive externality in the province's production.

The technological level or total factor productivity A_{it} is defined by

$$A_{it} = A_0 \exp(\lambda t + Z'_{it}\eta + \omega_{it}). \quad (5.3)$$

In this formulation, A_0 is a constant technological level, λt represents autonomous technological change, ω_{it} is the unobserved TFP. The remaining term, $Z'_{it}\eta$, corresponds to observed factors that can impact the TFP. For instance, in the context of our data, this may include provincial literacy rate as a measure of human capital and the shares of agriculture and services in provincial production.

By plugging equations (5.3) and (5.2) into equation (5.1), we obtain the production function of each province as follow:

$$Y_{it} = A_0 \exp(\lambda t + Z'_{it}\eta + \omega_{it}) \frac{G_t^\theta}{K_t^{\theta\varphi} L_t^{\theta\psi}} K_{it}^\alpha L_{it}^\beta G_{it}^\gamma \exp(\varepsilon_{it}). \quad (5.4)$$

Taking logarithmic transformation of equation (5.4) gives the following expression

$$y_{it} = a_0 + \lambda t + Z'_{it}\eta + \omega_{it} + b_K k_{it} + b_L l_{it} + \theta g_{it} + \alpha k_{it} + \beta l_{it} + \gamma g_{it} + \varepsilon_{it} \quad (5.5)$$

where the lowercase letters represent variables measured in logs, i.e. $x \equiv \ln X$ with $X = Y_{it}, K_{it}, L_{it}, G_{it}, K_t, L_t, G_t$. Furthermore, the coefficients of the model are $a_0 \equiv \ln A_0$, $b_K \equiv -\theta\varphi$, and $b_L \equiv -\theta\psi$.

Estimation of the model can rely on the method developed by Pakes and Olley (1995), Levinsohn and Petrin (2003), and Akerberg et al. (2006).⁵ Without any restriction on the productivity level ω_{it} , the model cannot be estimated. Following these authors, we consider here that ω_{it} is a non-specified function of input choices at the local level, i.e. $\omega_{it} = m(k_{it}, l_{it}, g_{it})$. It results that ω_{it} is not separately identified from

⁵See also van Beveren (2012) for a literature survey.

$\alpha k_{it} + \beta l_{it} + \gamma g_{it}$. Moreover, because the nonparametric nature of m , i.e. it is identified up to an additive constant, the regression intercept a_0 is subsumed into g . Equation (5.5) can be rewritten as

$$y_{it} = \lambda t + Z'_{it}\eta + \Psi(k_{it}, l_{it}, g_{it}) + b_K k_t + b_L l_t + \theta g_t + \varepsilon_{it} \quad (5.6)$$

where $\Psi(k_{it}, l_{it}, g_{it}) \equiv m(k_{it}, l_{it}, g_{it}) + \alpha k_{it} + \beta l_{it} + \gamma g_{it}$.

The estimation procedure of Pakes and Olley (1995), Levinsohn and Petrin (2003), and Akerberg et al. (2006) can be briefly sketched as follows. The first step is to estimate λ , η , b_K , b_L , θ , and function Ψ by using the Robinson (1988) method. When estimates for b_K , b_L and θ are available, φ and ψ can be estimated by the delta method.

In the second step, it is assumed that ω_{it} follows a first-order Markov chain, i.e.

$$\omega_{it} = E(\omega_{it} | \omega_{i,t-1}) + \zeta_{it}, \quad (5.7)$$

where ζ_{it} is the white noise. By using a first set of estimates for α , β , and γ , denoted as α^0 , β^0 , and γ^0 , we can compute $\tilde{\omega}_{it} = \hat{\Psi}(k_{it}, l_{it}, g_{it}) - (\alpha_K^0 k_{it} + \beta_L^0 l_{it} + \gamma^0 g_{it})$, which can be used in the nonparametric regression $E(\tilde{\omega}_{it} | \tilde{\omega}_{i,t-1})$. The next operation is to compute the innovation term $\tilde{\zeta}_{it}(\alpha_K^0, \beta_L^0, \gamma^0) = \tilde{\omega}_{it} - E(\tilde{\omega}_{it} | \tilde{\omega}_{i,t-1})$, which evidently depends on $(\alpha^0, \beta^0, \gamma^0)$. Finally, we obtain the following moment conditions

$$E \left[\tilde{\zeta}_{it}(\alpha^0, \beta^0, \gamma^0) \begin{pmatrix} k_{i,t-1} \\ l_{i,t-1} \\ g_{i,t-1} \end{pmatrix} \right] = 0. \quad (5.8)$$

Finally, the optimization over $(\alpha^0, \beta^0, \gamma^0)$ provides a GMM estimation for (α, β, γ) .⁶ The bootstrap procedure can be employed to compute the standard errors for all the

⁶We can also use the moment conditions

$$E \left[(\tilde{\zeta}_{it} + \tilde{\varepsilon}_{it}) \begin{pmatrix} k_{i,t-1} \\ l_{i,t-1} \\ g_{i,t-1} \end{pmatrix} \right] = 0$$

parameters of the model.

After obtaining the estimates of the model, total factor productivity (net of autonomous technological change λt and deterministic factors $Z'\eta$) of province i at year t can be computed as (from equation (5.6)):

$$\hat{\omega}_{it} = y_{it} - \hat{\lambda}t - Z'_{it}\hat{\eta} - \hat{b}_K k_t - \hat{b}_L l_t - \hat{\theta}g_t - \hat{\alpha}k_{it} - \hat{\beta}l_{it} - \hat{\gamma}g_{it}. \quad (5.9)$$

5.3.2 Dynamics of total factor productivity

With the series on TFP in hands, we can analyze its distribution dynamics in order to shed light on the convergence/divergence process. The main question is whether a convergence in terms of TFP has taken place among 58 Vietnam provinces during the period of study.

Let $f_t(\omega_{it})$ and $f_{t-1}(\omega_{i,t-1})$ denote the distribution of TFP at time t and $t-1$, respectively. We assume that the process describing the evolution of the TFP distribution is time-invariant and of first-order in between t and $t-1$ (see Johnson, 2000, 2005), hence the relationship between the two distributions is given by

$$f_t(\omega_{it}) = \int_{-\infty}^{+\infty} f(\omega_{it} | \omega_{i,t-1}) f_{t-1}(\omega_{i,t-1}) d\omega_{i,t-1}, \quad (5.10)$$

where $f(\omega_{it} | \omega_{i,t-1})$ is the conditional density of current TFP given past values of TFP.

It should be noted that $f(\omega_{it} | \omega_{i,t-1})$ represents the distribution dynamics of TFP between $t-1$ and t . This function represents the continuous version of the transition matrix in a discrete space. Let $f_{t-1,t}(\omega_{i,t-1}, \omega_{it})$ denote the joint distribution of $(\omega_{i,t-1}, \omega_{it})$. The joint distribution at point (x^0, y^0) can be estimated by

$$f_{t-1,t}(x^0, y^0) = \frac{1}{NT h^2} \sum_{i=1}^N \sum_{t=1}^T K\left(\frac{x^0 - \omega_{i,t-1}}{h}\right) K\left(\frac{y^0 - \omega_{it}}{h}\right), \quad (5.11)$$

because equation (5.6) becomes

$$y_{it} = \hat{\lambda}t + Z'_{it}\hat{\eta} + \hat{\alpha}_K k_t + \hat{\alpha}_L l_t + \hat{\theta}g_t + \alpha_K k_{it} + \beta_L l_{it} + \gamma g_{it} + E(\tilde{\omega}_{it} | \tilde{\omega}_{i,t-1}) + \tilde{\zeta}_{it} + \tilde{\varepsilon}_{it}.$$

where estimates were plugged.

where $K(\cdot)$ is the univariate kernel function and h is the bandwidth. We use the Gaussian kernel and the optimal bandwidth proposed by Silverman (1986).

We obtain $f_{t-1}(\omega_{i,t-1}) = \int_{-\infty}^{+\infty} f_{t-1,t}(\omega_{i,t-1}, \omega_{it}) d\omega_{it}$ and

$$f(\omega_{it} | \omega_{i,t-1}) = \frac{f_{t-1,t}(\omega_{i,t-1}, \omega_{it})}{f_{t-1}(\omega_{i,t-1})}. \quad (5.12)$$

By using the conditional distribution $f(\omega_{it} | \omega_{i,t-1})$, we can calculate the ergodic density for TFP as

$$f_{\infty}(\omega) = \int_{-\infty}^{+\infty} f(\omega_{it} | \omega_{i,t-1}) f_{\infty}(\omega) d\omega. \quad (5.13)$$

This density represents the long-run behavior of provincial productivity.

5.4 Data

The data used in this chapter cover 58 provinces and municipalities of Vietnam and are provided by the General Statistics Office of Vietnam (GSO).⁷ They include series at the provincial level such as provincial GDP, provincial public expenditure, provincial total investment in physical capital, provincial labor force, shares of agriculture, services and industry in provincial GDP, and ratio of people able to read and write in provincial population. All these series, except ratio of people able to read and write, cover the period 2000-2007. The literacy rate is only observed in 2006. This database for a period of 8 years is the best we can obtain at the provincial level until now.

Data at the national level are extracted from the World Development Indicators database of the World Bank. They correspond to GDP, national public expenditure, gross fixed capital formation, national labor force, GDP deflator and gross national expenditure deflator for the period 2000-2007. Table 5.1 reports the list of 58 provinces

⁷Official data at the provincial level, usually provided by the General Statistics Office for a longer period are not available. Vietnam has in total 58 provinces and 5 municipalities. However, five provinces (Ha Giang, Hau Giang, Kon Tum, Dong Thap, and Tra Vinh) were excluded from our data sample due to missing data. Ha Tay was merged into the capital Ha Noi in 2008.

Table 5.1: List of provinces and municipalities

Name	Period	Name	Period	Name	Period
Ha Noi*	2000-2007	Hai Phong*	2000-2007	Vinh Phuc	2000-2007
Bac Ninh	2000-2007	Hai Duong	2000-2007	Hung Yen	2000-2007
Nam Dinh	2000-2007	Ninh Binh	2003-2007	Ben Tre	2000-2007
Lao Cai	2000-2007	Bac Kan	2000-2007	Lang Son	2000-2007
Yen Bai	2000-2007	Thai Nguyen	2000-2007	Phu Tho	2000-2007
Quang Ninh	2000-2007	Lai Chau	2000-2007	Dien Bien	2000-2007
Hoa Binh	2001-2007	Thanh Hoa	2000-2007	Nghe An	2000-2007
Quang Binh	2005-2007	Quang Tri	2000-2007	Thua Thien-Hue	2005-2007
Quang Nam	2000-2007	Quang Ngai	2000-2007	Binh Dinh	2000-2007
Khanh Hoa	2000-2007	Dong Nai	2000-2007	Gia Lai	2000-2007
Dak Nong	2000-2007	Lam Dong	2000-2007	Ho Chi Minh city*	2000-2007
Binh Phuoc	2000-2007	Tay Ninh	2000-2007	Binh Duong	2001-2007
Binh Thuan	2000-2007	Ba Ria-Vung Tau	2000-2007	Long An	2000-2007
An Giang	2000-2007	Tien Giang	2000-2007	VinhLong	2000-2007
Kien Giang	2000-2007	Can Tho*	2000-2007	Ninh Thuan	2000-2007
Soc Trang	2005-2007	Bac Lieu	2002-2007	Cau Mau	2000-2007
Ha Tay	2000-2007	Ha Nam	2000-2007	Cao Bang	2000-2007
Tuyen Quang	2005-2007	Bac Giang	2000-2007	Son La	2000-2007
Ha Tinh	2000-2007	Da Nang*	2000-2007	Phu Yen	2000-2007
Dak Lak	2000-2007				

Notes. There are 53 provinces and 5 municipalities (stared).

and municipalities and Table 5.2 summarizes the definition and the sources of variables used in estimations. Table 5.3 reports main statistics for series used in this study.

Concerning variables at the provincial level, there are two types of investment in physical capital, private investment (PI) and foreign direct investment (FDI). These variables are expressed in billion VND and in 2010 prices using the GDP deflator series available from the WDI database. Then, we use the perpetual inventory method (PIM) to compute the series on physical capital stock for each type of investment, i.e. K_{it}^{PI} and K_{it}^{FDI} .⁸ Finally, the stock of total private physical capital at the local level is given by the sum between two stocks of capital, i.e. $K_{it} = K_{it}^{PI} + K_{it}^{FDI}$.

⁸The equation characterizing the PIM is $K_{it}^{\tau} = S_{it}^{\tau} + (1 - \delta)K_{i,t-1}^{\tau}$ where S_{it}^{τ} is the flow of investment of type τ ($\tau = PI$ or FDI), K_{it}^{τ} is the capital stock of type τ at time t , and δ is the depreciation rate. The initial capital stock is given by $K_{i0}^{\tau} = S_{i0}^{\tau} / (g_S^{\tau} + \delta)$ where g_S^{τ} is the average geometric growth rate of investment of type τ for the period of study. Usually the depreciation rate is set between 4% and 6%. In this paper, changing δ from 4% to 6% does not modify the qualitative results.

Table 5.2: Variable definition

Variable	Description	Source*
National level		
K_t	National physical capital stock, 2010 prices, billion VND	our calculations
L_t	National labor force, thousands people	WDI
G_t	National public expenditure, 2010 prices, billion VND	MOF
Local level		
Y_{it}	Provincial GDP, 2010 prices, billion VND	GSO
K_{it}	Provincial physical capital stock, 2010 prices, billion VND	our calculations
L_{it}	Provincial labor force, thousands people	GSO
G_{it}	Provincial public expenditure, 2010 prices, billion VND	GSO
S_{it}^{PI}	Private investment, 2010 prices, billion VND	GSO
S_{it}^{FDI}	Foreign direct investment, 2010 prices, billion VND	GSO
Ind_{it}	Share of industry in provincial GDP (reference)	GSO
Agr_{it}	Share of agriculture in provincial GDP	GSO
Ser_{it}	Share of service in provincial GDP	GSO
H_i	Ratio of people able to read and write in population, 2006	GSO

Notes. * WDI: World Development Indicators, MOF: Vietnam Ministry of Finance, GSO: General Statistics Office.

Concerning public expenditures at national and provincial levels (G_t and G_{it}), we use the total public expenditure as there is not reliable data on the public investment expenditure which is often considered as factor production. As shown in Table 5.4, this information is available only 12 among 58 provinces during the 2000-2007 period.

This variable and provincial GDP (Y_{it}) are measured in billion VND and in 2010 prices (using the GDP deflator). We observe that the data for some variables at the provincial level such as investments (S_{it}^{PI} and S_{it}^{FDI}), provincial GDP, provincial public spending, and provincial labor force (L_{it}) are missing in 2004. Thus, we compute the average geometric growth rates of these series to interpolate the missing values in order to complete the data for each of the 58 provinces and municipalities included in the data sample.⁹ However, this operation can exacerbate the potential measurement

⁹Let g_x denote the average geometric growth rate of a series x . Hence, the relation between the initial and the final values of this variable is $x_t = x_0(1 + g_x)^t$ and t is the length of the period of study. Hence, the average growth rate of x is approximately calculated as $g_x = \ln(x_t/x_0)/t$. This growth rate can be also computed as $g_x = \exp(b) - 1$ where b is the slope coefficient of the ordinary least squares regression $\ln x_t = a + bt + v_t$, $t = 1, 2, \dots, T$.

Table 5.3: Descriptive statistics

Variable	Mean	Std.Dev.	Min.	Max.
K_t	584223.51	198453.55	310483.31	919427.91
L_t	44950.95	2241.10	41324.12	48166.10
G_t	46366.11	8921.28	23725.57	56800.15
Y_{it}	23121.40	40988.93	1155.76	334111.21
K_{it}	10765.26	198453.55	170.95	177912.82
L_{it}	685.27	534.60	47.8	3340.03
G_{it}	3736.54	5323.40	53.25	42116.90
S_{it}^{PI}	3718.66	7388.06	20.94	62899.12
S_{it}^{FDI}	1457.61	3754.54	0	22929.91
Ind_{it}	0.30	0.14	0.06	0.91
Agr_{it}	0.36	0.16	0.01	0.75
Ser_{it}	0.33	0.08	0.07	0.59
H_i	0.92	0.07	0.60	0.98

Notes. Number of observations: 425 (58 provinces and municipalities, period 2000-2007).

Table 5.4: Share of public investment expenditure in total public expenditure

Year	2000	2001	2002	2003	2005	2006	2007	2000-2007
1. National level (G_t)	27.2	31	30.51	36.77	34.57	32.91	31.01	32.64
2. Provincial level (G_{it})								
Hanoi	26.28	25.91	49.12	50.19	43.55	46.90	52.93	45.16
Hochiminh city	27.66	41.11	49.72	46.01	36.85	27.56	39.58	37.39
Danang	44.32	56.11	65.48	71.05	68.65	67.11	51.88	62.60
Hai Phong	16.69	24.70	29.96	32.72	31.23	28.24	26.59	28.04
Dong Nai	26.26	39.64	38.01	30.68	24.05	24.55	19.67	25.61
Binh Duong	42.51	46.43	46.84	43.83	41.02	46.52	40.86	43.63
Son La	27.81	37.81	34.04	31.63	9.3	3.6	9.1	16.43
Thai Nguyen	27	34.71	33.92	33.08	15.63	13.88	17.57	21.65
Nam Dinh	22.52	21.31	25.38	37.32	15.69	17.90	26.12	22.54
Binh Phuoc	41.56	41.43	33.68	33.86	21.45	19.54	28.24	27.90
An Giang	36.38	33.01	36.97	39.84	21.28	22.37	23.18	26.97
Kon Tum	32.86	29.72	29.24	22.85	23.96	28.45	36.08	28.54

Source: Vietnam Ministry of Finance, General Statistic Office annual report from 2000-2007

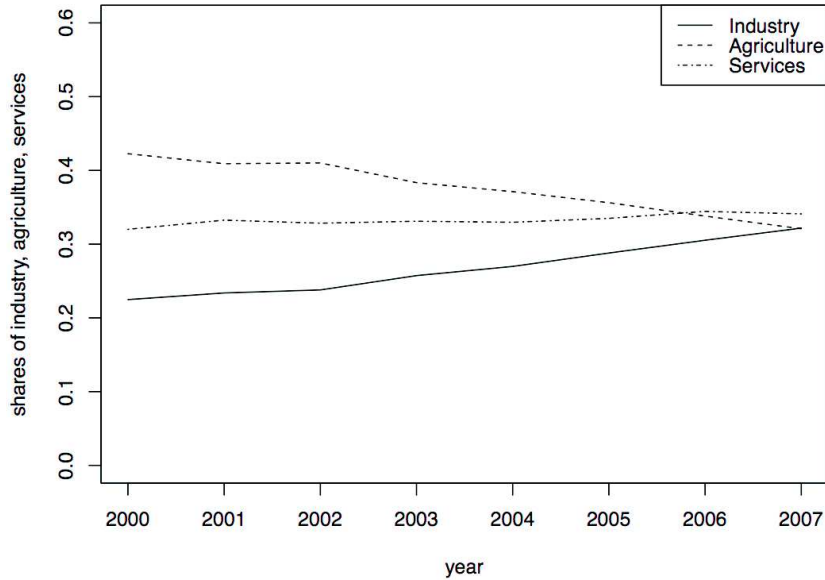


Figure 5.3: Evolution of shares of industry, agriculture, and services in provincial GDP. The curves correspond to the median values computed yearly. *Source: General Statistic Office of Vietnam, Ministry of Finance, and World Bank.*

error relative to data collection and affects the quality of estimation. This issue will be addressed in Section 5.6.

Regarding variables at the national level, the national stock of physical capital K_t is defined as the sum of local stocks of physical capital, i.e. $K_t = \sum_i^N K_{it}$. Data on labor force are obtained from the WDI and are expressed in thousands people. For national public spending G_t , we use the series on central government expenditure on investment from the Vietnam Ministry of Finance (MOF) database and compute its corresponding values in 2010 prices (in billion VND) using the GDP deflator (from the WDI).

5.5 Results and discussion

We aim to estimate the production function as well as three components of the TFP of 58 Vietnam provinces. The estimation is performed in two steps. In the first step,

Table 5.5: Estimation results

Variable	Coefficient	Estimate	Bootstrap Std.Err.
<i>Production inputs</i>			
Provincial physical capital	α	-0.116	0.110
Provincial labor	β	0.819**	0.315
Provincial public spending	γ	-0.144	0.307
National physical capital	b_K	0.201	3.708
National labor	b_L	-10.922	20.441
National public spending	θ	-0.037	0.323
<i>Congestion effects</i>			
Capital related	φ	5.400	110.026
Labor related	ψ	-293.218	2598.676
<i>Determinants of TFP</i>			
Agricultural share	η_{Agr}	-0.894**	0.385
Services share	η_{Ser}	-2.019**	0.607
Human capital	η_H	1.365*	0.751
Time trend	λ	0.201	0.740

Notes. Number of observations: 425 (58 provinces and municipalities, period 2000-2007). Standard errors are obtained by bootstrap (99 replications). Significance levels: * 10%, **: 5%.

we estimate the equation (5.6) and obtain the coefficients associated to autonomous technological change (λ), deterministic term of technological change explained by the share of agriculture in provincial production (η_{Agr}), the share of service in provincial production (η_{Ser}), the literacy rate of the provincial population in 2006 (η_H). We also obtain effects of other production inputs. In the second step, we compute the non-deterministic of TFP, i.e. TFP net of autonomous technological change and deterministic factors, as shown by equation (5.9).

Estimation results are presented in the Table 5.5. We observe that among different production inputs, only local labor has a positive and significant effect on the provincial production. The estimated parameter associated to this variable shows that in response to a rise of 1% in labor force, the provincial output increases about at 0.8%. There is no evidence of significant impact of public spending on provincial outputs and economic growth. This result concerns both provincial and central spending in infrastructure. In other words, all government spending during the period 2000-2007 are not effective

in terms of provincial TFP and economic growth. This result might be explained by the lack of control for provincial governance.¹⁰ Indeed, Bayraktar and Moreno-Dodson (2012) and ? have already underlined that at the national level, the significant effect of public spending could depend on the governance quality and macroeconomic stability. Another reason might explain the ineffectiveness of local public expenditure is the specificity of this expenditure in the case of Vietnam's provinces. Indeed, as shown in Table 5.4, the share of public investment expenditure in total public expenditure at the provincial level is very low. Indeed, during the period 2000-2007, this share does not even attain 50% for all provinces (except for Danang with 62%). For some provinces, such as Son La, Thai Nguyen, Nam Dinh, this share is lower than 25%. However, the investment expenditure often has a positive effect, as factor production, on the production activity.

Concerning the analysis of deterministic (observable) TFP, our findings shed light on the role of agricultural share in GDP per capita, services share in GDP per capita and human capital in explaining provincial TFP difference and provincial output difference. Indeed, it is shown that agricultural share and services share exert a negative influence on the TFP and output growth while the human capital has a positive and significant effect. This result is not surprising in the sense that intuitively, regions with high agricultural share and services share would have low part of industrial sector whose the presence is usually determinant for technological change. This is also the sector which develops important R&D activities necessary for technical progress and spillovers. The positive effect of human capital is consistent with numerous empirical findings (for example, Ascari and Di Cosmo (2005), Bronzilli and Piselli (2009) using data on Italian regions, Lynde and Richmond (1993) analyzing American TFP, etc.). It should be noticed that, our production estimation in the first step brings us to conclude that the production process in Vietnam's provinces is essentially based on labor and human capital.

In the second step, we compute nondeterministic component of TFP (i.e. ω_{it}) and

¹⁰However, a such variable is not available at the provincial level.

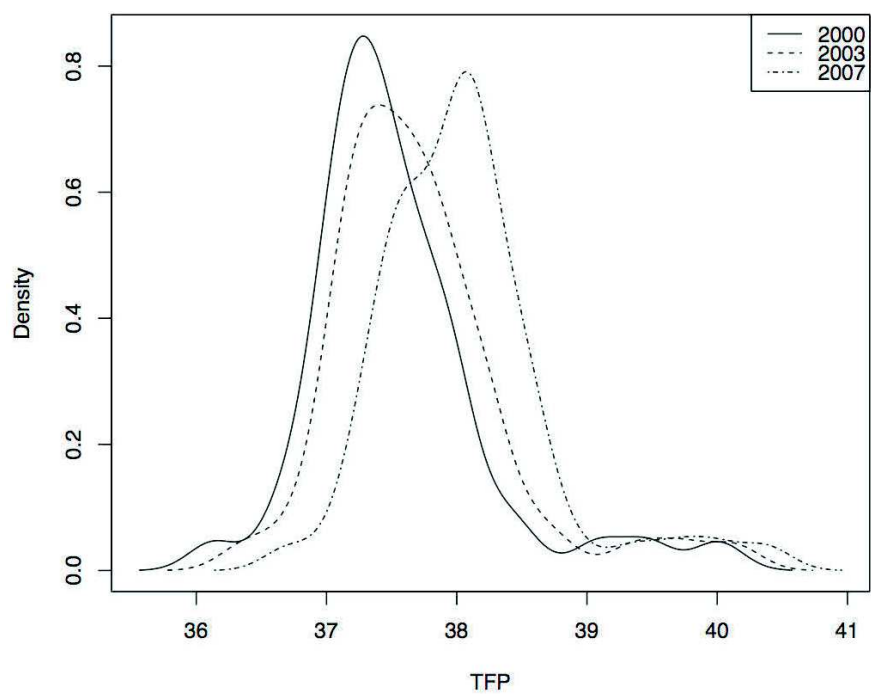


Figure 5.4: Distribution of provincial (unobserved) TFP in 2000, 2003, and 2007.

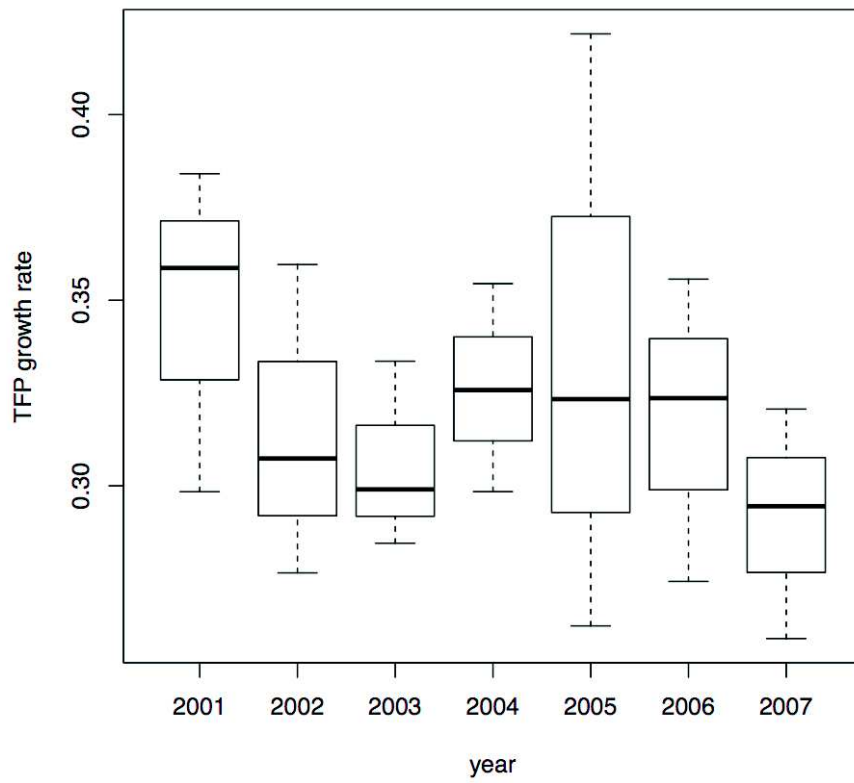


Figure 5.5: Growth rate of TFP without the autonomous technological change, period 2001-2007.

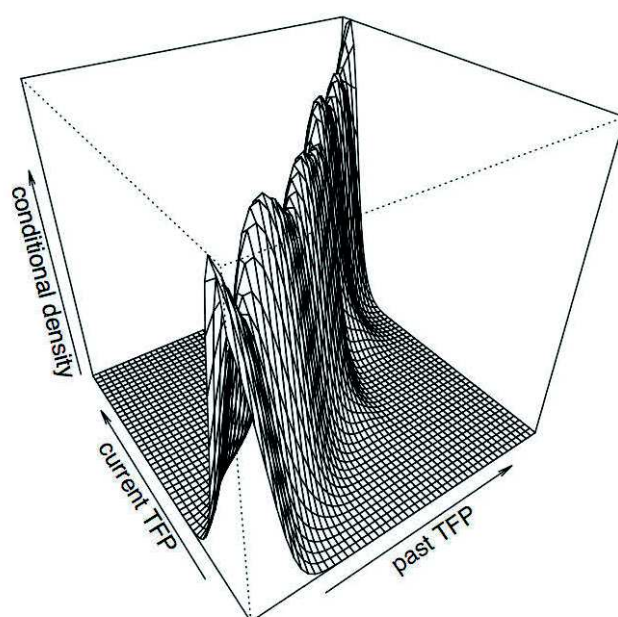


Figure 5.6: Surface of conditional density of provincial (unobserved) TFP $f(\text{current TFP} \mid \text{past TFP})$.

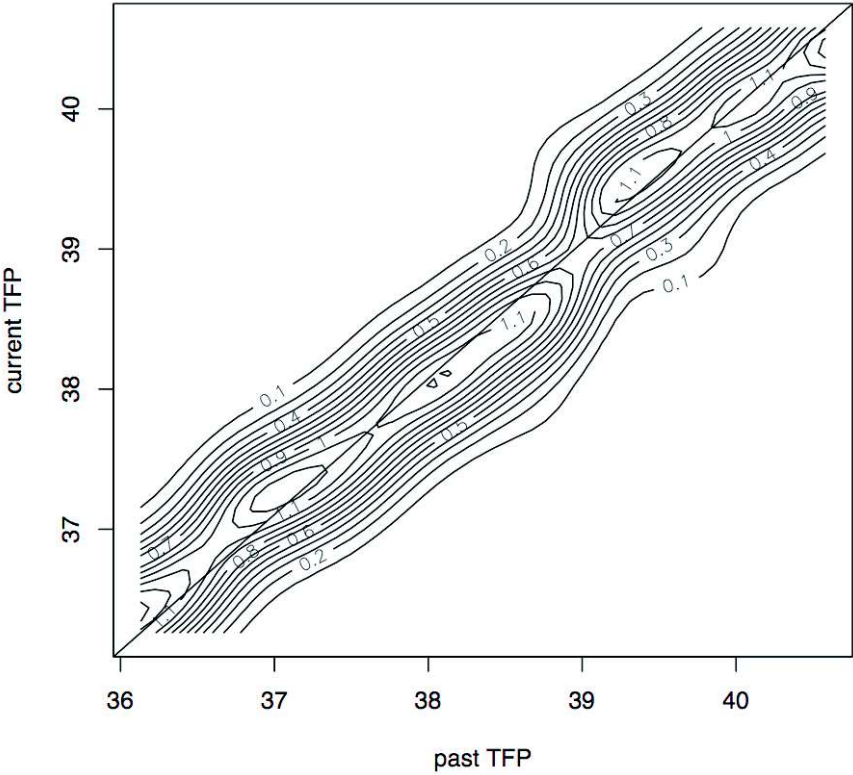


Figure 5.7: Contour plot of conditional density of provincial (unobserved) TFP $f(\text{current TFP} \mid \text{past TFP})$.

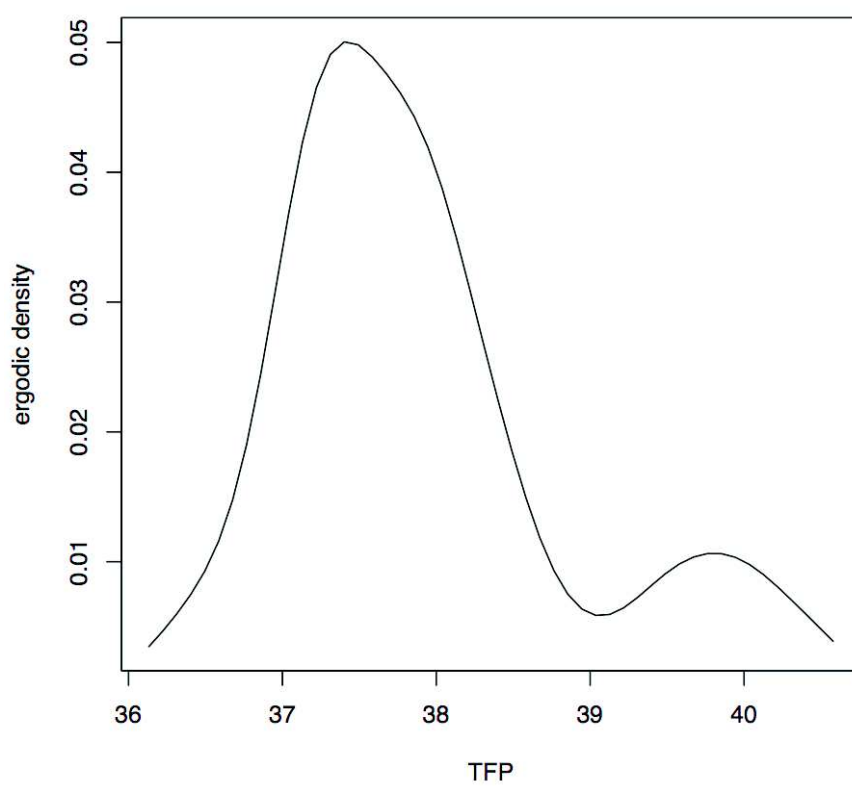


Figure 5.8: Ergodic distribution of provincial (unobserved) TFP.

analyze its distribution. Figure 5.4 displays the distribution of this component of TFP in 2000, 2003, 2007. Provincial TFP's increase over time is identified thanks to a parallel movement of the curve to the right.

We can also compute the growth rate of TFP as

$$\frac{\dot{A}_{it}}{A_{it}} = \lambda + \dot{Z}'_{it}\eta + \dot{\omega}_{it} \quad (5.14)$$

Hence, the variation of TFP comes from three components: a constant corresponding to autonomous technological change λ and two varying quantities, one is the variation of the deterministic and observed component ($\dot{Z}'_{it}\eta$) while the other is the variation of the stochastic unobserved component ($\dot{\omega}_{it}$).

Figure 5.5 displays the growth rate of TFP without the autonomous component. Some remarks are in order. First, the box sizes of different years are different as we have a unbalanced panel data. Second, the bold line indicates the median value of TFP growth rate. We observe that the growth rate of TFP during the period 2001-2007 is not constant and its value is found between 0.2 and 0.4.

Figure 5.6 represents the distribution dynamics of nondeterministic TFP between two years, t and $t-1$. It shows the conditional density of current TFP given past values of TFP. The conditional density for 58 provinces shows a multimodal distribution and contour plot in Figure 5.7 makes clear this observation by giving three peaks around the 45° line. Two peak on the 45° line (with low TFP for the first one and with high TFP for the second one) and one peak below the 45° line. This result indicates a weak decrease of TFP over time for regions with middle TFP. However, regions with low or high TFP value stay at their initial position. In the long run, the ergodic distribution of nondeterministic TFP given by Figure 5.8 shows the existence of two groups of provincial TFP. There is no evidence of convergence between 58 Vietnam provinces' TFP. Empirical findings rather shed light on a heterogeneity and polarization. In other words, regions with low TFP do not necessarily grow more quickly than provinces with high TFP.

5.6 Measurement errors

That data at the provincial level may contain unobserved measurement errors which can alter the quality of estimations. While measurement errors relative to local GDP y_{it} are not a serious problem (as they are automatically plugged into the regression residual terms), measurement errors concerning local capital stock k_{it} , local labor force l_{it} and local public spending g_{it} can induce important consequences with regard to the quality of parameter estimates. Indeed, in this situation, the residual terms in equation (5.6) becomes correlated with regressors, resulting in an inconsistent estimation for λ , η , b_K , b_L , θ , and function Ψ obtained at the first step.¹¹

To deal with this issue, we propose to modify the estimation procedure applied to equation (5.6). We suppose that each of the three variables k_{it}, l_{it}, g_{it} has an instrument set w_{it}^x so that we can write

$$x_{it} = \sum_j^J \pi_j(w_{jit}^x) + u_{it}^x, \quad x_{it} = k_{it}, l_{it}, g_{it}, \quad (5.15)$$

where π_j is the univariate nonparametric function for the j th component of the set of instruments w_{it}^x for x_{it} . In the context of our data, we think that a reasonable instrument set for x_{it} should correspond to its lagged value ($x_{i,t-1}$) and other local variables, including Z_{it} in equation (5.6).¹² The additive structure here allows us to keep the flexibility of nonparametric modelling and to avoid the curse of dimensionality when a nonparametric function contains a high number of arguments.

The model with measurement errors in local variables is composed of equation (5.6) and equations (5.15) and the assumption $E(\varepsilon_{it} | u_{it}^x, w_{it}^x) = E(\varepsilon_{it} | u_{it}^x) \neq 0$ and $E(u_{it}^x | w_{it}^x) = 0$. The method developed by Newey et al. (1999) can be adapted to estimate this model. Following Newey et al. (1999), we need an additional assumption that $E(\varepsilon_{it} |$

¹¹More precisely, if $x_{it} = x_{it}^* + \varepsilon_{it}^x$ where x_{it}^* is the unobserved true value of x_{it} , $x_{it} = k_{it}, l_{it}, g_{it}$, and ε_{it}^x is the corresponding measurement error, the new residual terms of equation (5.6) becomes $\vartheta_{it} \equiv \varepsilon_{it} + \varepsilon_{it}^k + \varepsilon_{it}^l + \varepsilon_{it}^g$. Hence, $E(\vartheta_{it} | k_{it}, l_{it}, g_{it}) = E(\vartheta_{it} | k_{it}^* + \varepsilon_{it}^k, l_{it}^* + \varepsilon_{it}^l, g_{it}^* + \varepsilon_{it}^g) = E(\vartheta_{it} | \varepsilon_{it}^k, \varepsilon_{it}^l, \varepsilon_{it}^g) \neq 0$.

¹²Using lagged values $x_{i,t-1}$ reduces the sample size from 423 observations to 364 observations.

$u_{it}^x) = \rho_x u_{it}^x$ with $x_{it} = k_{it}, l_{it}, g_{it}$. Hence, estimation for $\lambda, \eta, b_K, b_L, \theta$, and function Ψ in equation (5.6) can be obtained as previously described but with a preliminary step. Firstly, we implement the nonparametric estimation of the additive model in equation (5.15) for $x_{it} = k_{it}, l_{it}, g_{it}$ to compute the residuals \hat{u}_{it}^x . Secondly, we apply the Robinson's (1988) method, as described in Section 3.1, to equation (5.6), which now includes three additional regressors, $\hat{u}_{it}^k, \hat{u}_{it}^l$, and \hat{u}_{it}^g . Finally, estimation for α, β , and γ can be obtained as described above in Section 5.5.

Table 5.6 displays estimation results when measurement errors in local variables are taken into account. We can observe that considering these errors do not significantly change the results given in Table 5.6. Compared to previous results, labor force is no longer determinant for the provincial economic growth. The same remark for the agricultural share which has now no effect on the provincial TFP and economic growth. Concerning other significant factors, the observed effect of services share on the provincial TFP is less important while that of human capital is stronger in the new estimation.

5.7 Conclusion

This chapter aims to analyze the determinants and the dynamics of the TFP of Vietnam's provinces and their economic growth using panel data for 58 Vietnam's provinces during the 2000-2007 period. In a context of Vietnam economy which tends to increase its public expenditure over time, our study also tries to verify whether these government expenditures both at local and central level have significant impact on the productivity and economic growth of Vietnam's provinces.

Our main estimation results shed light unsurprisingly the positive effect of human capital on the provincial TFP and economic growth. Besides, among other production factors, only provincial labor force exerts a positive impact on the provincial economic growth. Concerning government expenditures, no significant effect is observed for our sample during the 2000-2007 period. This empirical finding points out the ineffective-

Table 5.6: Estimation results, accounting for *measurement errors*

Variable	Coefficient	Estimate	Bootstrap Std.Err.
<i>Production inputs</i>			
Provincial physical capital	α	-0.041	0.281
Provincial labor	β	0.229	1.236
Provincial public spending	γ	-0.093	0.362
National physical capital	b_K	-0.388	4.909
National labor	b_L	-12.271	40.059
National public spending	θ	-0.051	1.419
<i>Congestion effects</i>			
Capital related	φ	-7.592	231.809
Labor related	ψ	-240.290	6722.220
<i>Determinants of TFP</i>			
Agricultural share	η_{Agr}	-0.583	0.503
Services share	η_{Ser}	-1.582*	0.847
Human capital	η_H	1.421*	0.807
Time trend	λ	0.320	1.091

Notes. Number of observations: 367 (58 provinces and municipalities, period 2000-2007). Standard errors are obtained by bootstrap (99 replications). Significance levels: * 10%, ** 5%.

ness of government intervention in provincial TFP and economic growth.

When analyzing the dynamics of nondeterministic TFP, we observe a multimodal distribution of the conditional density of current TFP given past values of TFP. This finding highlights the heterogeneity of TFP across 58 Vietnam's provinces. It is confirmed when we analyze the long run situation where there is a polarization phenomena with two groups of TFP, high values and low values. Our result means that convergence process is not observed for the TFP and economic growth of Vietnam's provinces, i.e. provinces with low TFP do not necessarily grow more quickly than provinces with high TFP. While private factors such as labor force and human capital are key factors, government expenditures seem to be playing no role in explaining the TFP growth and economic growth of Vietnam's provinces. A control for governance should give more information on this result. Unfortunately, such a variable is not available at the provincial level.

6 Decentralization in Government Expenditure and Economic Growth: A Case of Vietnam

6.1 Introduction

Fiscal decentralization is defined as the fraction of total revenues collected and current expenditures allocated by local and regional government, some aspects influencing the fiscal decentralization are indicated such as inter-government transfers, forms of government, per capital income, and degree of urbanization (Kee, 1997). [Rondinelli et al. \(1983\)](#) supposed that the concept of decentralization is large, its components are many, so the definition and justifications are therefore necessary. A given definition by these authors was decentralization can be defined as the transfer of responsibility for planning, management and resource raising allocation from the central government and its agencies. They also stated that decentralization is not an absolute right solution to solve some problems of a nation such as administrative, political, or economic issues of

developing countries. Some decades ago, many developing countries which were colonial or implemented the centralized mechanism for control country purposes.

Vietnam, a developing country, suffers from independent wars, now look like "a new tiger" economy with huge achievements in economic development. Many researches are to find the rationale of "magic development". For instance, [Montes \(1995\)](#) stated that the success is a combination of good endowment, good policy, and good luck. At the same time, [Plummer \(1995\)](#) indicated that a part of the success in economic development is that Vietnam is willing to accept policy changes designed to encourage international trade and financial flows. [Womack \(1996\)](#) also addressed that foreign investment in Vietnam increased rapidly because policy changes in economic development strategy and two remarkable events decided outside of Vietnam, its admission to become a member of Southeast Asia Nations (ASEAN) and normalization in relationship between Vietnam and the United States of America in 1995 then a membership to World Trade Organization (WTO) in 2006 (Figure 6.1 shows the foreign direct investment due to policy changes in the period 1991-2014). The effectiveness of foreign direct investment is so clear. [Anwar and Nguyen \(2010\)](#) stated that FDI has a positive impact on provincial economic growth but authors also indicated that this relationship exists only in four main regions of Vietnam: Red River Delta, North East, South East, and Mekong River Delta.

One more important thing changed in Vietnam's policy that has been addressed by many authors is decentralization in government expenditure. [Martinez-Vazquez \(2004\)](#) stated that level of decentralization in government expenditure is high in comparison with some developing countries, the share of provincial governments in total government expenditure is about 40%. The author also indicated the State budget law 2002 allows provincial governments almost complete freedom to organize their budgets (see detail in Article 34 of the 2002 State budget law). Although published the State budget law makes incentives for provincial government in order to mobilize their resources for developing local economies, there are some debates about the impact of fiscal decentralization, specially decentralization in government expenditure on economic growth.

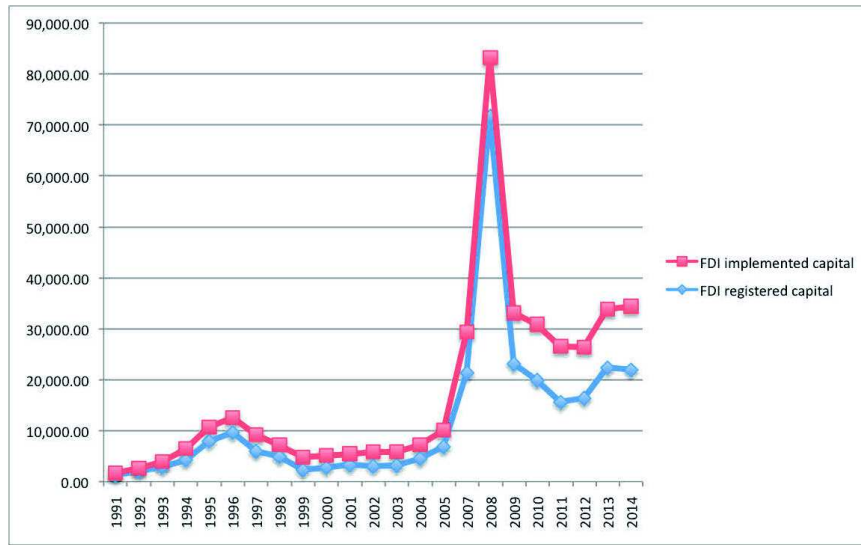


Figure 6.1: Total foreign direct investment in Vietnam during the period 1991-2014 (million USD). Source: General Statistic Office of Vietnam

Chinh-Thon and Thuy (2010) did a research with a sample of 31 provinces in Vietnam for the period 2004-2005 and stated that provincial government expenditure has a positive impact on economic growth if the ratio of provincial government expenditure to GDP exceeds a certain threshold meanwhile Nguyen (2008) considered about the impact of fiscal decentralization on poor people's income in Vietnam and addressed that a higher degree of fiscal decentralization is predicted to decrease poor people's income. In other research, Nguyen and Anwar (2011) found that economic growth in Vietnam is positively associated with revenue decentralization but negatively associated with expenditure decentralization. On other aspect, some authors analyzed the mechanism of fiscal decentralization in Vietnam, for instance, Martinez-Vazquez and Gomez (2005), Rao (2000), and Vo (2009). These authors concentrated on regulations of the 2002 State budget law in which they determined the problems of budget process, revenue and expenditure assignments to provincial governments.

Despite findings of already mentioned researches, there are some limitations of these studies, such as period of studying is too short (31 provinces for 2 years) or data is unavailable. This chapter aims to investigate whether decentralization in government

expenditure has significantly positive impact on economic growth across Vietnam's provinces for the period 2000-2007. The chapter is structured by 4 main parts. Section 6.2, literature will be reviewed regarding to fiscal decentralization. Then economic modeling will be presented by developing the model of Barro (1990), Devarajan et al. (1996), and Davoodi and Zou (1998) in Section 6.3. Section 6.5 introduces results estimation and discussion. Conclusion will be addressed in Section 6.6

6.2 Overview on government expenditure decentralization and growth

The theory of fiscal federalism is concerned about the assignment of functions to different levels of government, the appropriate fiscal instruments for implementing these function, and performance of each government level. With respect to social welfare, an output of public services, it was more efficient for the local government than the central government if the costs of providing public goods and services of each level of government are the same because the local government is self-consciously and distinctively with its area (Oates, 1972 and Rondinelli et al, 1983). The level of fiscal decentralization between developing and developed countries is still some arguments. The author stated that the developing countries appear to be far centralized than in the industrialized countries as results of empirical research by Oates (1993) and indicated the decentralized finance appears to have a potentially useful role to play in the economic development. For example, with sample of 43 countries, Oates (1993) emphasized that an average share of central government spending in total public expenditure of 65 percent, and 89 percent in subsample of 18 industrialized nations and subsample of 25 developing nations, respectively. In particular, the average share of central government in the developing countries was exceeded of 90 percent in terms of revenue. In contrast, Bahl (1999) stated that in the developing countries, governments use the inter-government transfers as an instruments that give the national government varying degrees of control over the local government finances. These countries have more centralized fiscal structure than developed countries and argue that this is consistent

with the theory of fiscal federalism whilst economic development does push to many advantages of decentralization. Despite having many positive attitudes, the developing countries have concerned with some problems in decentralization. For instance, if nations decentralize more expenditures responsibilities than revenues, either service levels seem to be felt or, else local government will press - successfully, it is usually assumed that there are more transfers, loans, or both. Contrarily, if more revenues than expenditures are decentralized, it is often argued that local revenues mobilization may decline and again macro-economic imbalances might emerge (see Bird, 2008).

Even studying about fiscal decentralization is attractive to economists. However, there are some debates about decentralization impacts on economic growth. [Zhang and Zou \(1998\)](#) did investigate the impact of fiscal decentralization and economic growth in China for the period 1978-1992 and found that there is a negative relation between fiscal decentralization and provincial economic growth. Instead of measuring fiscal decentralization by the ratio of provincial spending to total central spending, [Lin and Liu \(2000\)](#) measured fiscal decentralization by the marginal retention rate of locally collected budgetary revenues by provincial governments and found the opposite results that fiscal decentralization has positive impact on economic growth in China with the same period ([Feltenstein and Iwata, 2005](#) had the same findings). The findings of [Lin and Liu \(2000\)](#) are also opposite with findings of [Davoodi and Zou \(1998\)](#) for cross-countries sample and [Xie et al. \(1999\)](#) for the United States. [Martinez-Vazquez and McNab \(1997, 2003\)](#), [Thornton \(2007\)](#), and [Feld et al. \(2016\)](#) supposed the empirical evidence of [Davoodi and Zou \(1998\)](#) and [Xie et al. \(1999\)](#) may not be entirely reliable because of several potential problems with the methodological approaches followed to derive those tests. For instance, measurement of fiscal decentralization might not reflect the subnational governments autonomy in expenditure decision-making. By using the "true" measurement of fiscal decentralization which captures amount of local governments autonomy, [Baskaran and Feld \(2013\)](#) indicated that there is no relationship between fiscal decentralization and economic growth in the sample of 23 countries of OECD for the period 1975-2001. With the different methodology, meta-regression, [Feld et al. \(2016\)](#) found

that fiscal decentralization has a significant effect on economic growth.

In the next section, we present a theoretical model to examine the relationship between decentralization in government expenditure and economic growth. The model is then estimated based on data of Vietnam provinces observed over the period 2000-2007.

6.3 Economic model

In this part, we apply the model developed by [Devarajan et al. \(1996\)](#) with the assumption that there are two levels of government, local government and central government. The expenditure decentralization is measured as a fraction of local government expenditure to total government expenditure in each province.

6.3.1 Government

Let g_{nt} presents total government expenditure, g_{lt} is local government expenditure, and g_{ct} is central government expenditure at time t .¹ We assume that there is only flat tax rate (τ) on income.

The government budget constraint is determined by

$$g_{nt} = \tau y_t. \quad (6.1)$$

with $g_{nt} = g_{lt} + g_{ct}$. Let define ϕ_c is the share of central government in total government expenditure and ϕ_l is the share of local government expenditure in total government expenditure ($\phi_l + \phi_c = 1$). Expenditures at both level of governments are:

$$g_{lt} = \phi_l g_{nt}, \quad (6.2)$$

$$g_{ct} = \phi_c g_{nt}. \quad (6.3)$$

¹All variables are in per capita terms

6.3.2 Firms

We assume that firms use the Cobb-Douglas production technology.

Cobb-Douglas production function:

$$y_t \equiv f(k_t, g_{lt}, g_{ct}) = Ak_t^\alpha g_{lt}^\beta g_{ct}^\gamma, \quad (6.4)$$

where k_t is private capital, A is total factor productivity, g_{lt}, g_{ct} are externalities of production function, $0 < \alpha, \beta, \gamma < 1$. We also assume that production function has a constant return to scale over time, $\alpha + \beta + \gamma = 1$.

Equation (6.4) can be rewrote as follow:

$$y_t \equiv f(k_t, g_{nt}) = A\phi_l^\beta \phi_c^\gamma k_t^\alpha g_{nt}^{\beta+\gamma}. \quad (6.5)$$

or

$$y_t = A\phi_l^\beta \phi_c^\gamma k_t^\alpha g_{nt}^{1-\alpha}. \quad (6.6)$$

Substitute equation (6.1) into equation (6.6) we obtain:

$$\frac{g_{nt}}{k_t} = (A\tau\phi_l^\beta \phi_c^\gamma)^{\frac{1}{\alpha}}, \quad (6.7)$$

$$\frac{y_t}{k_t} = \tau^{\frac{1-\alpha}{\alpha}} (A\phi_l^\beta \phi_c^\gamma)^{\frac{1}{\alpha}}. \quad (6.8)$$

Equation (6.7) implies that total government expenditure and private capital are grown at the same rate over time.

Representative firm will maximize their profit which determined by:

$$\Pi_t = f(k_t, g_{nt}) - r_t^k k_t. \quad (6.9)$$

with r_t^k is interest rate of capital. The first order condition for maximizing firm's profit

is:

$$r_t^k = f'_{k_t}(k_t, g_{nt}), \quad (6.10)$$

or

$$r_t^k = A\alpha\phi_l^\beta\phi_c^\gamma k_t^{\alpha-1} g_{nt}^{\beta+\gamma}. \quad (6.11)$$

equivalently,

$$r_t^k = A\alpha\phi_l^\beta\phi_c^\gamma \left(\frac{g_{nt}}{k_t}\right)^{1-\alpha}. \quad (6.12)$$

or

$$r_t^k = \alpha\tau^{\frac{1-\alpha}{\alpha}} (A\phi_l^\beta\phi_c^\gamma)^{\frac{1}{\alpha}}. \quad (6.13)$$

Equation (6.13) implies that interest rate of capital is constant and depends on elasticities of total output to capital, local government expenditure, central government expenditure, income tax rate, the share of local government expenditure to total expenditure, and total factor productivity.

6.3.3 Consumers

We suppose that individuals consume their total income on consumption and investment. Representative consumer's choice is maximized his utility through consumption c and investment k :

$$\max_{c,k} \sum_{t=0}^{+\infty} \theta^t U(c_t),$$

where θ is time preference and $\theta > 0$.

$$U(c_t) = \begin{cases} \frac{c_t^{1-\rho}-1}{1-\rho} & \text{if } \rho \neq 1 \\ \ln c_t & \text{if } \rho = 1 \end{cases} \quad (6.14)$$

where $\rho > 0$ is consumption discount rate. The budget constraint of consumer is determined as below:

$$k_{t+1} - k_t + c_t \leq (1 - \tau)y_t. \quad (6.15)$$

Inequality (6.15) means that consumer spending does not exceed their available income. On the expenditure side, $k_{t+1} - k_t$ represents consumer investment in the current period, c_t is consumption in current time. On the revenue side, $(1 - \tau)y_t$ corresponds to after tax income at the time t .

Lagrangian formulated by:

$$L = \sum_{t=0}^{+\infty} \theta^t U(c_t) - \sum_{t=0}^{+\infty} \lambda_t [(1 - \tau)y_t + k_t - k_{t+1} - c_t] + \sum_{t=0}^{+\infty} \mu_t k_t. \quad (6.16)$$

The first order conditions are given by:

$$\theta^t U'(c_t) + \lambda_t = 0, \quad (6.17)$$

$$\lambda_t [(1 - \tau)f'_{k_t}(k_t, g_{nt}) + 1] - \lambda_{t-1} + \mu_t = 0, \quad (6.18)$$

$$\mu_t k_t = 0. \quad (6.19)$$

with the transversality condition $\lim_{t \rightarrow \infty} \theta^t k_t = 0$. The slackness condition in (6.19) means that $k_t > 0, \mu_t = 0$ or $k_t = 0, \mu_t > 0$. Solving the equation (6.17) and equation (6.18) we obtain:

$$\frac{c_t}{c_{t-1}} = [\theta[(1 - \tau)r_t^k + 1]]^{\frac{1}{\rho}}. \quad (6.20)$$

which is the usual Keynes-Ramsey rule (or growth rate of consumption) which states that the marginal utility of past consumption is equal to the discounted marginal utility of current consumption times the interest rate.

Hence, replacing r_t^k in equation (6.20) by equation (6.13) we have:

$$\frac{c_t}{c_{t-1}} = \left(\theta \left[(1 - \tau) \alpha \tau^{\frac{1-\alpha}{\alpha}} (A \phi_l^\beta \phi_c^\gamma)^{\frac{1}{\alpha}} + 1 \right] \right)^{\frac{1}{\rho}}. \quad (6.21)$$

Equation (6.21) mentions that consumption growth rate is constant over time and depends on time preference θ , consumption discount rate ρ , income tax rate τ , elasticities of capital, local government expenditure, central government expenditure to total output captured by α , β , γ , and the share of local government to total government expenditure ϕ_l .

6.3.4 Equilibrium

In this model, we are interested in interior solution with $k_t, c_t > 0$. An equilibrium of the model is a set of following equations:

Government budget constraint

$$g_{nt} = \tau y_t. \quad (6.22)$$

Consumer budget constraint

$$k_{t+1} + c_t = (1 - \tau) y_t + k_t. \quad (6.23)$$

Keynes-Ramsey rule

$$\frac{c_t}{c_{t-1}} = \left(\theta \left[(1 - \tau) \alpha \tau^{\frac{1-\alpha}{\alpha}} (A \phi_l^\beta \phi_c^\gamma)^{\frac{1}{\alpha}} + 1 \right] \right)^{\frac{1}{\rho}}. \quad (6.24)$$

Transversality condition

$$\lim_{t \rightarrow \infty} \theta^t k_t = 0. \quad (6.25)$$

6.3.5 Balanced growth path

We observed that equation (6.24) shows the growth rate of consumption (c_t) is constraint over time (as the right-hand side of (6.24) only contain parameters of the model). Dividing both sides of equation (6.23) by k_t we obtain:

$$\frac{k_{t+1}}{k_t} + \frac{c_t}{k_t} = (1 - \tau) \frac{y_t}{k_t} + 1. \quad (6.26)$$

or

$$\frac{c_{t+1}}{c_t} \frac{c_t}{k_t} + \frac{c_t}{k_t} = (1 - \tau) \frac{y_t}{k_t} + 1. \quad (6.27)$$

Let us denote $z_t \equiv \frac{c_t}{k_t}$, the solution of model respects to set of variables k, c becomes the solution of new variable z . Equation (6.27) can be rewrote as following:

$$z_{t+1} \left(\theta \left[(1 - \tau) \alpha \tau^{\frac{1-\alpha}{\alpha}} (A \phi_l^\beta \phi_c^\gamma)^{\frac{1}{\alpha}} + 1 \right] \right)^{\frac{1}{\rho}} \frac{1}{z_t} + z_t = (1 - \tau) \tau^{\frac{1-\alpha}{\alpha}} (A \phi_l^\beta \phi_c^\gamma)^{\frac{1}{\alpha}} + 1. \quad (6.28)$$

or

$$z_{t+1} = \frac{\left(\left[(1 - \tau) \tau^{\frac{1-\alpha}{\alpha}} (A \phi_l^\beta \phi_c^\gamma)^{\frac{1}{\alpha}} + 1 \right] - z_t \right) z_t}{\left(\theta \left[(1 - \tau) \alpha \tau^{\frac{1-\alpha}{\alpha}} (A \phi_l^\beta \phi_c^\gamma)^{\frac{1}{\alpha}} + 1 \right] \right)^{\frac{1}{\rho}}}. \quad (6.29)$$

The steady-state equilibrium is a solution of equation (6.28) and defined by $z_{t+1} = z_t = z^*$ which is given by:

$$z^* = (1 - \tau) \tau^{\frac{1-\alpha}{\alpha}} (A \phi_l^\beta \phi_c^\gamma)^{\frac{1}{\alpha}} - \left(\theta \left[(1 - \tau) \alpha \tau^{\frac{1-\alpha}{\alpha}} (A \phi_l^\beta \phi_c^\gamma)^{\frac{1}{\alpha}} + 1 \right] \right)^{\frac{1}{\rho}}. \quad (6.30)$$

The result show that consumption and capital are grown at the same rate which is determined by total factor productivity (A), elasticities of capital, government expenditure

(α, β, γ) , income tax rate (τ) , time preference (θ) , capital and consumption depend on parameters such as time preference (θ) , intertemporal elasticity of substitution (ρ) , and the share of local government expenditure to total expenditure (ϕ_l) .

6.4 Impacts of tax rate and government expenditure decentralization on economic growth

The dynamic of model only depends on the behavior of z_t . At the balanced growth path of the model $z_t = z_{t+1} = z^*$ that means $\frac{c_t}{k_t}$ is constant, consequently consumption and capital are same growth rates. Equation (6.24) and equation (6.27) show that growth rate of economy is also constant. Equation (6.24) can be rewrote as below:

$$\Delta_y \equiv \frac{y_{t+1}}{y_t} = \left(\theta \left[(1 - \tau) \alpha \tau^{\frac{1-\alpha}{\alpha}} (A \phi_l^\beta \phi_c^\gamma)^{\frac{1}{\alpha}} + 1 \right] \right)^{\frac{1}{\rho}}. \quad (6.31)$$

By replacing $\phi_c = 1 - \phi_l$, we obtain the growth rate of economy:

$$\ln \Delta_y = \ln \left(\theta \left[(1 - \tau) \alpha \tau^{\frac{1-\alpha}{\alpha}} A^{\frac{1}{\alpha}} \phi_l^{\frac{\beta}{\alpha}} (1 - \phi_l)^{\frac{\gamma}{\alpha}} + 1 \right] \right)^{\frac{1}{\rho}}. \quad (6.32)$$

In the following parts, we will investigate the impacts of decentralization in local government expenditure and tax rate on economic growth.

6.4.1 Impact of government expenditure decentralization on economic growth

The impact of the share of local government expenditure on economic growth can be summarized as following:

Proposition 3 *Other things are equal, if $\phi_l < \frac{\beta}{\beta+\gamma}$, Δ_y increases with ϕ_l . On the other hand, if $\phi_l > \frac{\beta}{\beta+\gamma}$, Δ_y decreases with ϕ_l .*

Proof. Easily to see that

$$\frac{d \ln \Delta_y}{d \phi_l} = \frac{d \Delta_y}{d \phi_l} \frac{1}{\Delta_y}. \quad (6.33)$$

As $\frac{1}{\Delta_y}$ is positive with given parameters, the sign of $\frac{d \ln \Delta_y}{d \phi_l}$ is the sign of $\frac{d \Delta_y}{d \phi_l}$.

From equation (6.31), by taking derivatives of Δ_y with respect to ϕ_l , we obtain:

$$\frac{d\Delta_y}{d\phi_l} = M \left[\frac{\beta}{\alpha} \phi_l^{\frac{\beta-\alpha}{\alpha}} (1-\phi_l)^{\frac{\gamma}{\alpha}} - \frac{\gamma}{\alpha} \phi_l^{\frac{\beta}{\alpha}} (1-\phi_l)^{\frac{\gamma-\alpha}{\alpha}} \right]. \quad (6.34)$$

$$M = \frac{\theta^{\frac{1}{\rho}}}{\rho} (1-\tau) \alpha \tau^{\frac{1-\alpha}{\alpha}} A^{\frac{1}{\alpha}} \left[(1-\tau) \alpha \tau^{\frac{1-\alpha}{\alpha}} A^{\frac{1}{\alpha}} \phi_l^{\frac{\beta}{\alpha}} (1-\phi_l)^{\frac{\gamma}{\alpha}} + 1 \right]^{\frac{1-\rho}{\rho}} > 0.$$

We observe that equation (6.34) is positive if $\beta < \frac{\beta}{\beta+\gamma}$ and negative if $\beta > \frac{\beta}{\beta+\gamma}$. ■

In other words, decentralization in government expenditure will promote economic growth if the share of local government expenditure is low enough that determined by the ratio of elasticity of local government expenditure to sum of local government and central government elasticities. Otherwise, decentralization in government expenditure is harmful to economic growth, the result is similar to findings of [Devarajan et al. \(1996\)](#).

6.4.2 Impact of tax rate on growth rate of economy

The impact of tax rate on capital, consumption, total government expenditure, and economic growth can be summarized as following:

Proposition 4 *Other things are equal, if $\tau < 1 - \alpha$, Δ_y increases with τ . Otherwise, if $\tau > 1 - \alpha$, Δ_y decreases with τ .*

Proof. By taking derivative of Δ_y with respect to τ we obtain:

$$\frac{d\Delta_y}{d\tau} = N \left[\frac{1-\alpha}{\alpha} (1-\tau) \tau^{\frac{1-2\alpha}{\alpha}} - \tau^{\frac{1-\alpha}{\alpha}} \right]. \quad (6.35)$$

with

$$N = \frac{\theta^{\frac{1}{\rho}}}{\rho} \alpha A^{\frac{1}{\alpha}} \phi_l^{\frac{\beta}{\alpha}} (1-\phi_l)^{\frac{\gamma}{\alpha}} \left[(1-\tau) \alpha \tau^{\frac{1-\alpha}{\alpha}} A^{\frac{1}{\alpha}} \phi_l^{\frac{\beta}{\alpha}} (1-\phi_l)^{\frac{\gamma}{\alpha}} + 1 \right]^{\frac{1-\rho}{\rho}} > 0.$$

We also observe that equation (6.35) is positive if $\tau < 1 - \alpha$ and negative if $\tau > 1 - \alpha$. ■

The result shows that if tax rate is low enough that threshold of tax rate determined by the productivity of government expenditure ($\beta + \gamma$), an increase in tax rate will lead to an

increase in growth. On the other hand, if tax rate is high enough, an increase in tax rate is harmful to economic growth. The results are same with [Devarajan et al. \(1996\)](#).

6.5 Econometric estimation

6.5.1 Estimated equation

Recall equation of economic growth given by equation (6.32) which is equivalent to

$$\ln \Delta_y = \frac{\ln \theta}{\rho} + \frac{1}{\rho} \ln \left[(1 - \tau) \alpha \tau^{\frac{1-\alpha}{\alpha}} A^{\frac{1}{\alpha}} \phi_l^{\frac{\beta}{\alpha}} (1 - \phi_l)^{\frac{\gamma}{\alpha}} + 1 \right]. \quad (6.36)$$

Denote $B \equiv \frac{\ln \theta}{\rho}$, $C \equiv \frac{1}{\rho}$, $D \equiv \frac{1-\alpha}{\alpha}$, $E \equiv \alpha A^{\frac{1}{\alpha}}$, $G \equiv \frac{\beta}{\alpha}$. Equation (6.36) is equivalent to:

$$\ln \Delta_y = B + C \ln [E(1 - \tau) \tau^D \phi_l^G (1 - \phi_l)^{D-G} + 1]. \quad (6.37)$$

By assuming that $-1 < \ln [E(1 - \tau) \tau^D \phi_l^G (1 - \phi_l)^{D-G} + 1] < 1$, equation (6.37) can be linearized as follows:

$$\ln \Delta_y = B + C [E(1 - \tau) \tau^D \phi_l^G (1 - \phi_l)^{D-G}] + \epsilon_i. \quad (6.38)$$

where ϵ_i is the approximation error.

Denote $F \equiv C^* E$, equation (6.38) can be rewrote as follows:

$$\ln \Delta_y = B + F(1 - \tau) \tau^D \phi_l^G (1 - \phi_l)^{D-G} + \epsilon_i. \quad (6.39)$$

In the next part, we will estimate the impacts of tax rate, τ , and level of government expenditure decentralization, ϕ_l , on economic growth of province $\ln \Delta_y$ based on equation (6.39) by using Nonlinear Least Squares.

6.5.2 Data

The data used in this chapter are provided by General Statistics Office of Vietnam and Ministry of Finance for the period 2000-2007 that cover 57 provinces and municipalities of

Vietnam.² Data include series at provincial level, for instance, provincial GDP (both current prices and 2010 prices), provincial government expenditure including central government expenditure at provinces and local government expenditure at province. We observe that in the dataset, variables at provincial level including GDP, provincial government expenditure are missing in 2004. By computing the average geometric growth rate of these variables we interpolate the missing values for 57 provinces in our sample.

We also assume that provincial government expenditure and central government expenditure at provinces are consumed entirely within fiscal year, there are no transfers to another provinces.³ Hence, in the Section 6.3 we assume that there is only income tax rate in economy, the income tax rate in our data is calculated by ratio of local government expenditure to provincial GDP.

τ : Income tax rate, measured by ratio of local government expenditure at provinces to its GDP.

ϕ_l : Measured by ratio of local government expenditure to total government expenditure in provinces (level of government expenditure decentralization)

$\ln \Delta_y$: Growth rate of provincial GDP.

Table 6.1: Descriptive statistics

Variable	Mean	Std.Dev.	Min.	Max.
τ	0.265	0.166	0.042	0.971
ϕ_l	0.027	0.224	0.015	0.999
$\ln \Delta_y$	-0.063	0.670	-4.2675	2.160

Notes. Number of observations: 256 (57 provinces and municipalities, period 2000-2007).

6.5.3 Estimation results and discussion

We aim to estimate the provincial economic growth in relation with income tax rate and level of decentralization in government expenditure across provinces in Vietnam for the period

²There are 63 provinces of Vietnam, however, some provinces such as Ha Giang, Hau Giang, Kon Tum, Dong Thap, Tra Vinh, and Bac Kan were excluded from our data sample because their missing data

³This assumption is suitable with State budget law in Vietnam

2000-2007. First, we estimate the new parameters including B, D, F , and G mentioned in the equation (6.39). Then, we apply the delta method to estimate the initial parameters such as $\alpha, \beta, \rho, \theta$ and A .⁴

Table 6.2 shows values of such parameters B, F, D , and G as a results of estimation in which parameter B has a negative impact on $\ln \Delta_y$ at level of significance 5% meanwhile G is positive impact on $\ln \Delta_y$ at level of significance 10%. Based on identified parameters, applying delta method gives α, β, γ are identified.⁵ Table 6.2 indicates that initial parameters α and β have significant and positive impacts on economic growth $\ln \Delta_y$.

Table 6.2: Estimation results

Parameter	Coefficient	Std. Error	t-value
B	-0.2596	0.1274	-2.037**
F	5.0098	6.5295	0.767
D	1.3099	0.7984	1.641
G	1.3644	0.8192	1.666*
α	0.4329	0.1494	2.8933**
β	0.5906	0.2039	2.8965**
γ	-0.0235	0.1494	-0.1573

Signification codes: (**) 0.05, (*) 0.1

Notes. Number of observations: 256 (57 provinces and municipalities, period 2000-2007), Residual standard error: 0.6949

In the other words, capital investment and local government expenditure has a significant and positive impact on economic growth. In addition, α and β are the elasticities of capital and local government expenditure to provincial GDP, the results mean if capital investment increases by 1% that leads to increase by 0.4329% total output and the local government expenditure increases by 1% that will increase by 0.5906% total output. On the other hand, central government expenditure has no significant impact on economic growth in our case. As already mentioned in part 6.3, decentralization in government expenditure is measures by ratio of local government expenditure to total government expenditure in each province. The results also indicate that a higher level of decentralization in government expenditure leads to a higher

⁴The model allows to identify 4 structural parameters B, D, F , and G . There are however 5 reduced-form parameters ($\alpha, \beta, \rho, \theta, A$). Two parameters, α and β are easily identified. Among three remaining parameters (ρ, θ, A) which are related to each other, one of them is unidentified. For instance, if $A = 1$ we obtain $\rho = 0.086$ with standard error of 2.924 and $\theta = 0.978$ with standard error of 0.750.

⁵See more detail at Appendix 2

growth rate of economy. The findings are opposite of [Devarajan et al. \(1996\)](#), [Zhang and Zou \(1998\)](#), [Xie et al. \(1999\)](#), and [Iimi \(2005\)](#) findings who stated that fiscal decentralization has a negative relation to economic growth in developing countries. Moreover, our results also are opposite with findings of [Nguyen \(2008\)](#) who addressed that decentralization in government expenditure is negative relationship with economic growth in Vietnam. We suppose that some previous studies about fiscal policy and decentralization in government expenditure in case of Vietnam found different results because some kinds of data are unavailable at that time and period of these studies is too short. Furthermore, our findings mention that central government expenditure in provinces does not impact on provincial economic growth as suggestion by fiscal federalism theory. The reasonable explanation is that local governments may deeply understand their own economies and have priorities over investments through their expenditure meanwhile central government expenditures in provinces perhaps concentrates on regular spendings, for example, elder compensation, social security and defense, and so on that are determined as unproductive spendings following categories of [Barro \(1990\)](#).

6.6 Conclusion

In this chapter, we analyze the relationship between economic growth and government expenditure decentralization across Vietnam's provinces. We suppose that total government expenditure in province including two types, local and central government expenditure. We also assume that total government expenditure in province for fiscal year has been all consumed and there are no transfers to other purposes or to another government level. The theoretical model indicates that tax rate and provincial economic growth have the bell-shape form relation, so does the level of decentralization in government expenditure. For the case of Vietnam's provinces in the period 2000-2007, as α and β are the elasticities of capital and local government expenditure to provincial GDP, the results mean that if capital investment increases by 1% that leads to increase by 0.4329% total output and the local government expenditure increases by 1% that will increase by 0.5906% total output. The results also indicate that a higher level of decentralization in government expenditure leads to a higher economic growth in provinces.

Appendix 2: Technical part of delta method calculation

From first step of estimation, we obtain:

$$B \equiv \frac{\ln \theta}{\rho} = -0.2596, \quad (6.40)$$

$$C^*E \equiv \frac{\alpha A^{\frac{1}{\alpha}}}{\rho} = 5.0098, \quad (6.41)$$

$$D \equiv \frac{1 - \alpha}{\alpha} = 1.3099, \quad (6.42)$$

$$G \equiv \frac{\beta}{\alpha} = 1.3644. \quad (6.43)$$

From equation (6.42) and (6.43), we have:

$$\alpha = \frac{1}{1 + D} \quad (6.44)$$

or

$$\alpha = 0.4329 \quad (6.45)$$

$$\beta = \alpha G \quad (6.46)$$

or

$$\beta = 0.5906 \quad (6.47)$$

Furthermore, following the assumption of model, $\alpha + \beta + \gamma = 1$, we obtain:

$$\gamma = 1 - \alpha - G\alpha \quad (6.48)$$

or

$$\gamma = -0.0235 \quad (6.49)$$

Applying delta method we obtain:

$$\delta_\alpha^2 \equiv \frac{1}{(1+D)^4} \delta_D^2 = 0.0223, \quad (6.50)$$

$$\delta_\beta^2 \equiv G^2 \delta_\alpha^2 = 0.0416, \quad (6.51)$$

$$\delta_\gamma^2 \equiv \frac{1}{(1+D^2)} \delta_\alpha^2 = 0.1251. \quad (6.52)$$

Consequently, standard errors of parameters are the root of their variance.

For two additional parameters ρ and θ in case of $A=1$, from equation (6.40) and equation (6.41), we have

$$\begin{aligned} \rho &= \frac{\alpha}{F}, \\ \theta &= \exp(\rho B). \end{aligned}$$

Easily to obtain variance of ρ and θ as follows:

$$\delta_\rho^2 \equiv \alpha^2 \delta_F^2 + F^2 \delta_\alpha^2 = 8.552, \quad (6.53)$$

$$\delta_\theta^2 \equiv [\rho^2 \delta_\beta^2 + B^2 \delta_\rho^2] \exp(\rho B) = 0.5635. \quad (6.54)$$

Similarly, standard errors of ρ and θ are the root of their variance, respectively.

t-statistics can be computed by the following formula for all parameters:

$$t_x = \frac{x}{\delta_x} \quad \text{where } x=(\alpha, \beta, \gamma, \rho, \text{ and } \theta). \quad (6.55)$$

7 General Conclusion

Main findings of the PhD thesis

In general, this thesis endeavors to contribute to both aspects, theory and empirics, in terms of endogenous growth in which government expenditure and public debt have been considered. Obviously, studying about impacts of fiscal policy's components on economic growth has required to deal with many facets. Within the scope of the thesis, we try to study the relationship between some components of fiscal policy and economic growth. Furthermore, by developing and applying the existing models to empirical data we also estimate effects of government expenditure and decentralization in government expenditure on Vietnam's economy.

The initial question is if public debt consists of two kinds, external and domestic debt (internal debt), then how is about the relationship between government expenditure, external and domestic debt, and economic growth? In reality, for purposes of development, governments need to finance their expenditure such as expenditure on infrastructure, security and defense, healthcare, education, salary for state officials, and other targets of countries. Part of expenditure is financed by taxes collection in these countries, however, taxes collection in many cases is not enough to cover the government expenditure. Consequently, governments have to borrow from the central bank or financial markets in which governments have to bid for government's bonds in both the domestic and international market. In some developing

economies, where their financial markets are not fully integrated with the international financial market, they may borrow from the domestic market with lower price than the external market. As mentioned, some countries regulate the threshold of public debt in order to ensure economic development sustainability, for instance, it is lower than 60% of GDP in European countries (Maastricht Treaty) or 65% of GDP in Vietnam. However, there is no theoretical support for this threshold. The threshold of public debt might depend on political decision. In Chapter 4 as we discussed, with assumption that public debt consists of two types, domestic and external debt, and the ratio of the primary surplus to gross domestic income is linear function of the debt that ensure public debt is sustainable. We find that government expenditure, consumption, and domestic debt increase with tax on asset returns. However, if the productivity of physical capital is small or the ratio of debt is large, the effect of taxation is negative. In case of high productivity of capital, the impact of taxation on external debt is positive if the tax rate does not exceed a certain threshold, otherwise, the relation is decreasing.

Before investigating some particular aspects of Vietnam case, the thesis provides an overall picture of Vietnam's economy in order to support further studies in the next parts of thesis. In recent decades, Vietnam has many huge achievements in developing its economy through regional and global integration. From a very poor country (Thang, 2001 and Dollar, 1994) with the basic model of economic growth fixed to Soviet's model, Vietnam has been known as among countries with the fastest economic growth in the world (average annual growth rate was 7.56% for the period 1991-2000, and 7.26% for the period 2001-2010). Simultaneously, Vietnam also successes in controlling inflation rate which could negatively impact the economy (Barro, 1995; Gokal and Hanif, 2004; Gregorio, 1992; and Jones and Manuelli, 1995). For instance, inflation rate was about 774.4% in 1986 and it was around 6% in 2014. Consequently, the standard of living has been improved in terms of poverty reduction and GDP per capita. Of course, in order to have significant positive results, Vietnam has changed in legal framework, especially in economic policies. For example, the taxation system has been reformed twice from 1986 with new tax laws, the State budget law, and new law in public debt management. Actually, economic development of Vietnam is very impressive that drives us to study about some aspects of its economy.

With the purpose of finding evidence about determinants of economic growth, an im-

portant part of the thesis examines the relationship between government expenditure, total factor productivity, and economic growth across Vietnam's provinces. Findings show that there is a positive effect of human capital on the provincial TFP (hence, economic growth). Besides, among other production factors, only provincial labor force exerts a positive impact on the provincial economic growth. Concerning government expenditures, no significant effect is observed for our sample during the 2000-2007 period. This empirical finding points out the ineffectiveness of government intervention (both at local and central government levels) in provincial TFP and economic growth. Findings also address that the heterogeneity of TFP across 58 Vietnam's province is clear and there is a polarization phenomena with two groups of TFP, high values and low values in the long run. Reasonable explanation for these findings, we suppose that some provinces try to attract investors to invest in these provinces with many investment incentives, for instance, tax reduction on land use, special income tax rate offer, and so on. Consequently, the gap of investment between rich provinces and poor provinces is larger. Although investment incentives policy is regulated in the Investment law (see Investment law No. 67/2014/QH) that is equally to all provinces but it seems to be disadvantages for poor area where there is lack of trained human resources, inconvenience of transportation, and poor infrastructure. Furthermore, the State budget law 2013 causes inequality of infrastructure investment which may negative impact on investment attraction then influence provincial productivity and growth. The State budget law 2013 regulates that the local budgets shall be balanced on the principle that the total expenditure might not exceed the total revenue. In case provinces or municipalities need an investment in infrastructure, they can borrow from markets, however, the total outstanding borrowing shall not exceed 30% of the annual investment of provinces (exception for Hanoi and Hochiminh city, total outstanding borrowing can be up to 100% of annual investment).

Some people argue that rich provinces not only can balance their budgets but also have budget surpluses which have been transferred to central government and then it is allocated to poor provinces. We may realize that the Vietnam's government has reallocated the State budget in order to obtain a balance budget of province reducing inequality between provinces. However, as we indicate in Chapter 5, government expenditure is ineffective. Furthermore, we investigate whether decentralization in government expenditure can boost economic growth across Vietnam's provinces in Chapter 6. The findings show that local government expenditure

has a positive relation with economic growth, meanwhile there is no evidence that central government in provinces has a relation with economic growth. The results also mean a higher level of decentralization in government expenditure leads to a higher level of economic growth.

Limitation and further research

Despite of efforts, however, the thesis may encounter some limitations, which need to be considered as below:

In chapter 3, we develop the new economic model based on Barro (1990) and Greiner (2007) in order to examine the relationship between government expenditure, public debt, and economic growth in which public debt is classified by two kinds, domestic and external debt. The findings are interesting. However, it is difficult to test the model using real data because the data are often unavailable.

Chapter 5 and Chapter 6 estimate the relationship between government expenditure, total factor productivity, decentralization in government spending, and economic growth by applying existing data of Vietnam. As mentioned in each chapter, some kinds of data are unavailable. For example, components of government expenditure such as government expenditure on education, healthcare, security and defense, payroll, etc.. are not fully provided. The findings may be more interested if this detailed information is taken into account.

Further research: The thesis covers a part of fiscal policy and economic growth with significant contributions, in case of Vietnam especially. Further researches will concentrate on taxation, another side of fiscal policy, and its impact on long-run economic growth. Past theoretical work predicts that a higher corporate tax rate could reduce economic growth, while the effects of high personal income tax rates are unclear (see Lee and Gordon, 2005). Some empirical researches showed that the ratio of taxes revenue to GDP has a negative impact on growth as a results of cross-section regression in OECD countries for the period 1960-1988 (Easterly and Rebelo, 1993), the higher maximum levels of federal personal income tax rate and corporate income tax rate have a negative impact on economic growth as a results of empirical investigation for the period 1955-1972 in the United States by Cebula (1995). Besides, some authors addressed that tax reform may influence economic growth (Jorgenson and Yun, 1990; Kim,1998, 2000; and Sujjapongse, 2005, etc..). In Vietnam, as mentioned

above, tax reform programs had been implemented twice from 1984 and the third program of tax reform is on going. The further study will investigate the relationship between tax reform, tax structure and long run economic growth in case of Vietnam. The idea is to adapt the model of [Jorgenson and Yun \(1990\)](#) and [Lee and Gordon \(2005\)](#) an perform an empirical test based on developing countries, especially Vietnam.

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Fiscal Policy, Public Debt, and Economic Growth: Applications to Vietnam

Résumé

Cette thèse vise à contribuer à des études récentes portant sur les effets des dépenses publiques, de la fiscalité, de la dette publique et de la productivité totale des facteurs sur la croissance économique, en particulier dans le cas du Vietnam. Avant d'aller plus loin, cette thèse présente un aperçu du contexte économique du Vietnam au cours des dernières décennies, notamment en termes de croissance économique, de contrôle de l'inflation, de système fiscal et son renouvellement, de la réduction de la pauvreté et de la dette publique. D'une part, cette thèse distingue la dette publique en deux types: la dette intérieure et la dette extérieure et fournit un message principal selon lequel une augmentation de l'impôt sur le rendement des actifs peut avoir un impact positif sur les valeurs d'équilibre des principales variables macroéconomiques exprimées en ratios de capital physique (consommation, dépenses publiques et dette intérieure). Deuxièmement, parmi les autres facteurs de production, seule la main-d'œuvre provinciale exerce un effet positif sur la croissance économique provinciale alors que les dépenses publiques n'ont pas d'effets significatifs sur la croissance au cours de la période 2000-2007. Enfin, la décentralisation des dépenses publiques favorisera la croissance économique si la part des dépenses des collectivités locales est suffisamment faible, part déterminée par le rapport de l'élasticité des dépenses des collectivités locales à la somme des élasticité des collectivités locales et du gouvernement central. Les résultats de l'estimation montrent que la décentralisation des dépenses publiques dans le cas du Vietnam a un impact positif sur la croissance économique, un niveau plus élevée de décentralisation des dépenses publiques conduisant à une croissance économique plus élevée.

Abstract

This thesis aims to contribute to recent studies which carry out the effects of government expenditure, taxation, public debt, and total factor productivity on economic growth, especially in case of Vietnam. Before going to further, this thesis introduces an overview on Vietnam's economy context in some recent decades. For instance, economic growth, inflation control, taxation system and its renewal, poverty reduction, and public debt issue. First, this thesis distinguishes public debt by two types, domestic and external debt and delivers a main message that an increase of tax on returns to assets can positively impact the steady-state values of main macroeconomic variables expressed in ratios of physical capital (consumption, public expenditure, domestic debt). Second, among other production factors, only provincial labor force exerts a positive impact on the provincial economic growth while government expenditure has no significant effect on growth for our sample during the 2000-2007 period. Finally, decentralization in government expenditure will promote economic growth if the share of local government expenditure is low enough that determined by the ratio of elasticity of local government expenditure to sum of local government and central government elasticities. Estimation results show that decentralization in government expenditure in case of Vietnam has a positive impact on economic growth, the higher level of decentralization in government expenditure leads to higher economic growth.

Keywords: Fiscal policy, growth, taxation, productivity

JEL classification: H50; H63; O40; C23
