Univerzita Karlova v Praze

Fakulta sociálních věd

Institut ekonomických studií

Diplomová práce

2005 **Jan Zápal**

Univerzita Karlova v Praze

Fakulta sociálních věd

Institut ekonomických studií

DIPLOMOVÁ PRÁCE

POST KEYNESIÁNSKÁ DAŇOVÁ TEORIE

Vypracoval: Jan Zápal

Vedoucí: Prof. Ing. Milan Sojka, CSc.

Akademický rok: 2004 / 2005

Prohlášení:

Prohlašuji, že jsem diplomovou práci vypracoval samostatně a použil pouze uvedené prameny a literaturu.

V Praze dne 19. května 2005

Rád bych poděkoval vedoucímu mé práce, Prof. Ing. Milanu Sojkovi, CSc., za pomoc, připomínky a podnětné rady, které výraznou měrou přispěly ke konečnému obsahu mé práce.

Charles University Prague

Faculty of Social Sciences

Institute of Economic Studies

DIPLOMA THESIS

POST KEYNESIAN TAX INCIDENCE THEORY

Author: Jan Zápal

Consultant: Prof. Ing. Milan Sojka, CSc.

Academic Year: 2004 / 2005

I hereby confirm that I have written my diploma thesis on my own and that all sources are given the full credit.

Prague, May 19, 2005

I would like to thank to Prof. Ing. Milan Sojka, CSc., consultant of my thesis, for helpful comments, observations and guidance, which he kindly supplied during my work on the thesis and which noticeably shaped its final content.

ABSTRACT

In my work, I survey Post Keynesian tax incidence theory, outlining its origins, methodological approach and basic conclusions as well as rationale behind them. Since Post Keynesian tax incidence theory differs considerably from mainstream tax incidence theory, conclusions of both theories are contrasted and origins of differences are identified.

As an illustrative example, I describe recent trends in the field of taxation in the Czech Republic and capture basic structure of Czech tax system by calculating effective tax rates from national accounts data. Both, structure of the tax system and recent changes, are then interpreted from the standpoint of Post Keynesian and mainstream tax incidence theories. Basic conclusion is that structure of tax system in the Czech Republic complies rather with mainstream optimal taxation recommendations than with advices Post Keynesian tax incidence theory would put forth.

ABSTRAKT

Tato práce nabízí přehled Post Keynesiánské daňové teorie, popisuje její základy, metodologický přístup a základní závěry. Protože se Post Keynesiánská daňová teorie výrazně liší od standardní daňové teorie, porovnávám ve své práci závěry obou a snažím se identifikovat důvody těchto odlišností.

Rozdíl mezi oběmi teoriemi ilustruji na příkladu jejich interpretace současných daňových trendů a struktury českého daňového systému. Současné daňové trendy jsou popsány změnami v daňovém systému a struktura daňového systému pomocí efektivních daňových sazeb spočtených na základě dat národního účetnictví. Hlavním závěrem je, že český daňový systém odpovídá spíše doporučením standardní daňové teorie než doporučením Post Keynesiánské daňové teorie.

JEL CODES: **B40; B50; H22; H71**

Keywords: **Post Keynesian tax incidence theory**
Mainstream tax incidence theory
Effective tax rates

CONTENT

LIST OF GRAPHS AND TABLES

1. Introduction

Taxes have always had a prominent position within economic theory. Beside different theories of consumer choice, prices (value), interest rate, investment, production, unemployment, business cycle, international trade or growth, taxes have been analyzed from numerous angles.

Students of economics, as soon as they learn how to use basic supply-demand curves, can show that those that are liable to pay the tax do often differ from those who's income is lowered or who's prices increase. In other words, students, using very basic economic apparatus, are able to see a counterintuitive result that legal tax incidence (who is liable to pay the tax) may, and often will, differ from economic incidence (who's income decreases).

As Kotlikoff and Summers (1987) note, tax incidence theory is both fun and interesting exercise because it allows one to come to counterintuitive and quite surprising results, which can have important policy implications. So-called optimal taxation theory is one of the examples with its focus on deriving the principles for tax system that minimizes excess burden with given government revenue needs.

Nowadays a need or urge for economic theory to be able to supply meaningful tax theory is even more pressing, when governments of most of the developed countries of western world redistribute, and hence need to raise through taxation, approximately half of national product of those countries.

This essay aims to briefly describe the treatment of taxes within Post Keynesian stream of economic thought. Through description of basic building blocks, origins and main conclusions I hope to illustrate that Post Keynesian tax incidence theory arrives at quite surprising conclusions not only to those, who are new to economics, but also to economists raised within neoclassical tradition.

Presented work is novel in several respects. First of all, to my knowledge, the work is the most comprehensive survey of the Post Keynesian tax incidence theory to be found. Second, it is the first work which directly compares methodological approach and contrasts conclusions of mainstream and Post Keynesian tax incidence theory. And lastly, it is the first work which for the Czech Republic estimates effective tax rates based on national accounts data and interprets them from the mainstream and the Post Keynesian tax incidence theory standpoint.

The essay is structured as follows. In the next section, I try to trace the origins of the Post Keynesian tax theory and describe its main differences from the mainstream theory in the third section. Subsequent parts describe main conclusions of the Post Keynesian tax theory as regards microeconomic effects of taxes (part four) and short-run (part five) and long-run (part six) macroeconomic effects of taxes. Part seven describes empirical tests and possible applications of the Post Keynesian tax theory. Part eight explains and contrasts the mainstream tax incidence theory of corporate taxation, savings, investment and growth with the Post Keynesian tax incidence theory, searching for most notable differences and their origins. Part nine describes recent trends in the field of taxation in the Czech Republic and interprets them through the eyes of both, mainstream and Post Keynesian tax incidence theories. Part ten then concludes the work.

2. Origins of the Post Keynesian Tax Incidence Theory

Reading works which stem from authors active within the Post Keynesian stream of thought usually gives an impression that the whole body of economic theory is based upon ideas of Lord Keynes. This especially applies for works dealing with monetary and truly macroeconomic issues, focused rather on short-term working of economic system, problems of insufficient effective demand or works dealing with cyclical fluctuations.

Within this literature, problems of an insufficient demand giving rise to cyclical fluctuations, involuntary unemployment and suboptimal private investment activity are usually said to call for public sector involvement. Economic policy should be expansionary during downswings and contractionary during upswings, in order to smooth economic cycle and to prevent long periods of less than full utilization of resources.

However, the exact nature of public sector involvement is open to interpretations. As Brown-Collier and Collier (1995) note, careful reading of Keynes' works in its entirety offers following interpretation: Keynes meant that governments should pursue policies that are pro-investment oriented and undergo investment activity by themselves only in case of most severe downswings, when animal spirits and expectations of private economic agents are so low as that there are almost no new investments.[1]

Second possible interpretation of Keynes which calls for government intervention activity is the purpose-built interpretation of majority of politicians. This interpretation, so heavily condemned in Buchanan and Wagner (1977), eventually led to era of fiscal tuning during post-war period of last century and rising government regulation of economy in most of the developed countries. However, what Buchanan and Wagner (1977) termed failure of Keynesian economic policies is in Brown-Collier and Collier (1995) words rather a failure of governments to pursue Keynesian economic policies.

Interestingly, there is another theoretical source of the Post Keynesian theory that can be found. The work of Michal Kalecki. His stress on determinants of income distribution, determinants of economic activity, determinants of profits, long-run growth prospects of economy, or impact of imperfect competition on growth of income has been an important inspiration to many economists we today call Post Keynesians.

An advantage of theories that originate from Kalecki is that they are closer to what can be called "normal" theories. Kalecki's papers are acceptably formalized, not

[1] See Ballard (1995) for interesting discussion of how Keynes reached such conclusion and for discussion of Keynes' intellectual development and the way he divorced from classical economic theory.

extensively open to various interpretations as the Keynes' *General theory of Employment, Interest and Money* (Keynes (1936)). This allows a theorist interested in analysis of various taxes simply to add a variable describing tax into already existing model, which would not be possible within Keynes' framework, since any formalized theory based on Keynes is only one of possible interpretation of Keynes' verbal description of his view of how economy functions. Furthermore, while Keynes' *General theory* is more or less incorporated into classical economics[2], Kalecki's theories display or incorporate principles stressed by Post Keynesians.

Therefore, there are basically three intellectual sources of the Post Keynesian tax theory. First one is already mentioned work of Kalecki. His theory of income distribution (Kalecki (1971)), theory of profit determination (Kalecki (1941 and 1942)) and theory of business cycle (Kalecki (1935 and 1937a)) offer a natural starting point for tax theory elaboration. Kalecki himself wrote only one paper on the tax incidence theory named *A Theory of Commodity, Income, and Capital Taxation* (Kalecki (1937b)). It is interesting to ask, why did he not elaborate on his theory any further. As Laramie and Mair (2003) note, the reason for this might be Kalecki's primary concern with developing the core of his theoretical framework, investment-driven theory of long-run growth.

Second intellectual source of the Post Keynesian tax incidence theory is work of Nicholas Kaldor. Especially his famous paper *Alternative Theories of Distribution* (Kaldor (1955)) can be considered as an important inspirational source for tax theory elaboration. Besides his 1955 paper, Kaldor (1957)[3] can also be used to assess an impact of taxes on behaviour of economic system.

Third intellectual source is the work of Luigi L. Pasinetti. He, in his article termed *Rate of Profit and Income Distribution in Relation to the Rate of Economic Growth* (Pasinetti (1962)), expressed what is in economic theory known as *Cambridge theorem* and which offers a natural starting point for investigation of effect of taxes on long-term growth of economy.

Theories of Kalecki, Kaldor and Pasinetti do have in common the fact that they are usually quite distant from standard classical and neoclassical theories. In other words, not only those theories differ in conclusions from the mainstream, but they also differ in methodological approach they take, differ in assumptions made, differ in underlying view about basic economic principles and differ in view on how economy functions. I will try to describe most important differences in the next section.

---

[2] This is what has been later on termed as "Keynes' attempt to attack classical economics on its home field".

[3] I must admit that Kaldor's model of economic growth outlined in this paper exhibits clear properties of models later on termed as endogenous growth models. What is surprising is that those models became to be known some two decades later after Kaldor published his paper.

3. Methodological Differences from the Mainstream Theory

Post Keynesian theory differs significantly from the mainstream theory. Exactly the same statement applies to the Post Keynesian tax incidence theory.

Post Keynesian stream of thought developed as one of the interpretations of ideas put forth by Keynes in his *General Theory of Employment, Interest and Money*. Early attempts to define and describe the Post Keynesian economics were rather a negative definitions towards the mainstream economics of those days. Typical definition was that Post Keynesian economics is that "which rejects" and then followed the list of typically mainstream assumptions and concepts.

This changed significantly. One of the first non-negativistic definitions of the Post Keynesian economics can be found in Eichner and Kregel (1975) who describe basic differences from the mainstream within four major areas of theory – growth and dynamic; distributional effects; monetary issues; and microeconomic base. They stress the role of historic time, uncertainty, classes, non-neutrality of money and different behavioural assumptions within the Post Keynesian microeconomic theory.

Probably the most influential and comprehensive definition of the Post Keynesian stream of economic thought is that of Lavoie (1992a). He stresses four major concepts, any model or theory that wants to be called Post Keynesian must incorporate, which are – realism; organicism; bounded rationality; and production.

Realism, opposed to the mainstream's *instrumentalism*, calls for realism of assumptions a researcher makes before he goes on and creates any model or a theory. This is in direct opposition to Friedman's (1953) claim that realism of assumptions does not matter. Since Post Keynesians are rather sceptical about the possibility of empirical tests of conclusions[4] of any theory, realism of assumptions, or their independent testing, matters.

Organicism, opposed to the mainstream's *individualism*, can be also called a holistic or non-individualistic approach. Post Keynesians do not deny that some decisions can be taken by individuals independently, on the other hand, they stress that the majority of decisions will be constrained by existing institutions, habits or decision makers' membership in certain social class. Furthermore, decisions will be made in accordance with past experience and within time which cannot be reversed and with knowledge that consequences of today's decisions may apply for quite long time in the future. Simply, individual behaviour for Post Keynesians is interdependent.

Bounded rationality, opposed to the mainstream's *substantive rationality*, stresses the fact that no person may acquire all the relevant information needed to make

[4] Not to speak about the predictions.

any decision and if this in fact happens, very little people will be able to determine the optimal, utility maximizing alternative. Inability to acquire all the relevant information is due to the fact that information is costly and some of it even not available at the date decision is made. Some of it will be revealed by future events, which is in the Post Keynesian theory uncertain, not probabilistic.[5] Therefore, people inhabiting Post Keynesian models base their behaviour on rules of thumb, on what has been confirmed by tradition or on what other people do. In Friedman's words, pool players do not know laws of physics and still play according to them, but their poll table seems to be shaking.

Production principle, as opposed to the mainstream's *scarcity*, stresses the fact that Post Keynesians are mainly concerned with analysis of production process and effects different variables have on production and investment activity. Within the mainstream, production is constrained by available resources, within the Post Keynesian theory, production is constrained by low effective demand, poor expectations or low investment activity.

All what has been said translates directly into the Post Keynesian tax incidence theory. The mainstream tax incidence theory is usually embedded in models based on full employment setup, applicability of Say's law, perfect rationality, instantaneous adjustment mechanisms, probabilistic expectations, neutrality of money, perfect competition[6] and individualistic approach to analysis.

It is based on marginal productivity of factors of production, which are usually assumed to be fixed in supply. Within such models, effect of tax on factor of production is mainly a matter of its effect on user cost of that factor in production. Taxed factor of production is after the introduction of taxes (due to change in relative prices) released by taxed industry and overall effect is determined by intensity of its use in taxed, as well as in un-taxed industries along with changes in demand for production of those

[5] Davidson (1988) makes difference between ergodic and non-ergodic worlds. Mainstream ergodicity means that all future contingencies and their probabilities are known, which implies that future is known on probabilistic terms and in such an environment, economic agents can form fully rational expectations which come true on average. On the other hand, Post Keynesian world is non-ergodic and thus future is fundamentally unknown which precludes formation of fully rational expectations.

[6] This is in fact a simplification. Perfect competition based mainstream tax incidence models are to be found usually in works that analyze macroeconomic effects of taxation. Other extreme is to consider perfect monopoly. As Damania and Mair (1992a) note, mainstream tax incidence theory is convinced that effect of taxation in oligopoly setting is somewhere in between the effects of taxation in perfect competition setting and perfect monopoly setting, which is not necessarily and generally true.

industries and elasticities of substitution of production factors in manufacturing process.[7]

In their critique of the mainstream tax incidence theory, Damania and Mair (1992a) note that if fixed supply of factor of production is assumed and effect of economy wide introduction of its taxation is investigated, tax shifting is precluded by definition since tax can be shifted only through reduced supply. Since reduced supply is assumed away, legal tax incidence must coincide with economic one.[8] It is therefore doubtful if such models can bring any new knowledge.

The role played by marginal productivity in the mainstream models investigating effects of taxation in production is replaced by the role substitution effects play in models of tax effects on consumer choice. Since for the mainstream economists relative prices and related substitution effects are major determinants of demand on microeconomic level, they must be incorporated into any model investigating effects of taxation on consumer choice or selling side of production.

Quite differently, the Post Keynesian tax incidence theory takes another approach. Instead of being preoccupied with effect of taxes on production side of the economy, it usually stresses the effect of taxation on effective aggregate demand and derives all the other effects in causal chain from therein. Since aggregate effective demand is usually closely related to different spending classes of society, natural starting point of many Post Keynesian tax incidence models is the theory of income distribution extended for tax variables.

An advantage of the Post Keynesian approach is, to the contrary to the mainstream marginal productivity approach, that the conclusions are empirically testable. It is always possible to obtain relevant statistics for the distribution of national income and test empirically the conclusions of a given model or a theory.

As a part of effective demand in their models, Post Keynesians usually pay close attention to government behaviour. Since government expenditures are part of effective demand, Post Keynesian tax incidence conclusions usually differ significantly depending on whether government spends additional tax revenues or uses them to decrease budget deficit or increase budget surplus. And it comes as an implication of

---

[7] What has been described here is a verbal presentation of basic principles on which famous model in Harberger (1962) is built and which has been modified in numerous ways to assess the impact of various taxes. Harberger's model, with only decent overstating, can be said to be the basis of the mainstream macroeconomic tax incidence theory. Nevertheless, it is built on principles that can be found in absolute majority of the mainstream tax incidence models.

[8] Besides attacking marginal productivity foundations of the mainstream tax incidence theory, it can be attacked from another angle. As Pasinetti (1966a) notes, one of the implications of Sraffian theory is that relative user costs of factors of production do not have any relation with relative intensities of their use in manufacturing process. If such a fact is accepted, the mainstream tax incidence theory based on substitution of factors of production according to their relative prices looses any sense.

what has been said above that the Post Keynesian tax incidence theory is, instead of being concerned with substitution effects of tax changes, preoccupied with income effects of taxation.

When Post Keynesians treat production side of the economy in their models, they usually inhabit their models with firms, which operate within neither perfectly competitive environment, nor within perfect monopoly setting. Post Keynesian firms usually set their prices as mark-ups above their prime costs. Profits of those firms usually, along with animal spirits and expectations, have pronounced impact on investment decisions and therefore determine profits in the future. This double-sided relationship between profits and investment is clearly in spirit of Asimakopulos (1971).

There is not much room in the Post Keynesian tax incidence theory for interest rate to equal the level of investment with the level of savings.[9] Investment decisions are for Post Keynesians determined in spirit outlined above, while savings adjust to satisfy required level of funds needed to materialize those investment orders. Interest rate is in the Post Keynesian theory set institutionally by central monetary authority, a central bank. If any variable should equate savings with investment in the Post Keynesian theory, it is not an interest rate but rather a price level or national income, which unhappily can ensure this equality at a lower than full employment level.

What is important to distinguish in a tax incidence theory in general is the manner in which any given school separates short-run analysis and long-run analysis.

In the mainstream tax incidence theory, this distinction is usually made in such a way as that short-run is the time period immediately after the introduction or announcement of a given change in the tax system. Long-run on the other hand is everything beyond this. In the spirit of the mainstream theory, adjustment processes are usually very fast, and therefore, if any further changes take place within long-run it is due to rationally computed adjustment path in original period which usually maximizes utility or any other variable of concern.

From what has been just said follows that mainstream tax incidence models usually pay no more than couple of paragraphs to short period analysis and proceed to investigate long-run effects of taxation.

Post Keynesian distinction between short-run and long-run analysis is rather different. Despite the fact that in some of the papers it is hard to say what type of the analysis is elaborated on, there are generally two distinguishing features that can be found.

The first one is based on fixed investment assumption. For Post Keynesians, investments are timely to take and hence, in current time period investments are fixed

[9] And in Post Keynesian theory in general.

by past decisions and investment orders, while today's decisions determine future investments. Therefore, if fixed (variable) investment assumption is made, analysis can be said to cover short-run (long-run).

The second distinction is based on full employment assumption. Models that assume idle resources can then be treated as short-run and the opposite applies to models assuming full employment.

4. Microeconomic Effects of Taxation

Investigation of the effects of a tax system in microeconomic setting is usually restricted to analysis of the effects of taxes on consumer choice.[10] Any such analysis must inevitably take an existing consumer choice theory and expand it in such a way to be able to say anything about the effects of taxation.

The mainstream theory usually starts with standard version of consumer choice theory known to everybody from its textbook presentation. In the spirit of the whole stream, substitution effects, relative prices relations or maximization of utility plays a dominant role.

What has been outlined is basically an optimal taxation theory concerned with so called equal-revenue changes in the tax system, so as to minimize excess burden of taxation. Elasticity of substitution or demand plays a dominant role within this theory since excess burden stems from the endeavour of economic agents to escape the taxation through switching to another product or activity. Natural policy implication is thus that those goods or activities exhibiting higher elasticity of substitution or demand should be taxed at lower rates than those activities or goods that are supplied or demanded less elastically.[11] Another implication of the mainstream optimal taxation theory calls for comprehensiveness of a tax base, since fewer goods that are tax-exempt mean fewer possibilities for tax avoidance and therefore lower excess burden of taxation.[12]

Another possible use of the mainstream consumer choice theory is an illustration of tax shifting. Basic principle can be summarized as that tax, no matter who is liable to pay it, will fall more than proportionally on those economic agents that behave less elastically with respect to the taxed commodity or activity.

It should be noted that real-world tax systems are quite often very far from recommendations of the mainstream theory. First of all, consistent application of less-elastic-higher-tax principle would call for very many different tax rates at which commodities would be taxed. Moreover, such a tax system would be very regressive

---

[10] Besides that, taxes in microeconomic setting do exhibit influence on choice of economic agents between leisure and labour or can have impact on choices within manufacturing process. Nevertheless, both topics immediately expand to macroeconomic level and are therefore usually treated as macroeconomic.

[11] This is what is within the mainstream public finance known as *Ramsey rule* proposed originally in Ramsey (1927) and modified later on in numerous ways. Nevertheless, basic logic of higher elasticity means lower taxation has been always preserved.

[12] This is the policy implication that Brennan and Buchanan (1980) attacked so heavily claiming that more comprehensive tax base means more possibilities for revenue maximizing government (Leviathan in their terms) to extract resources from citizens. I believe that Post Keynesians would attack both policy implications, using different arguments, which I am to discuss shortly.

since all the necessary goods which are demanded inelastically would be taxed at high rates, while luxury goods would be taxed at low rates.

Another policy implication of the mainstream tax theory is based on the claim that demand for any commodity is inversely related to the tax applied to it. This offers a starting point for heavier taxation of commodities that are assumed to be harmful to health of consumers or environmental-unfriendly. It is interesting to note that both policy implications are complementary to each other at this point. Goods that "should" not be consumed are usually those demanded inelastically and thus deserve heavier taxation on minimum-excess-burden grounds as well as on detrimental-to-health grounds. Besides that, since those commodities are usually those consumed by wide classes of population, they offer welcomed source of revenues to unsatisfiable governmental needs.

Alike mainstream economists, Post Keynesians (would[13]) apply their consumer choice theory to the investigation of microeconomic effects of taxes. As Lavoie (1992b) and Lavoie (1994) notes, Post Keynesian consumer choice theory can be characterized by six basic principles.

The principle of procedural rationality implies that consumers usually do not undergo the maximization procedure while deciding among different goods. This is because they do not possess all the relevant information, and even if they did, they would not be able to process them fast enough. In fact, deciding usually does not take place since consumers quite often follow rules of thumb and therefore buy what they are used to, what they have bought always and what has proved satisfactory. This allows people to make many day-to-day and repeating decisions fast enough, not sacrificing much of the efficiency at the same time.

The principle of satiable needs is the Post Keynesian version of mainstream diminishing marginal utility, however within the Post Keynesian theory most of the needs are satisfiable with positive prices and finite income. Therefore, for most of the goods a threshold quantity can be found above which consumers derive no more satisfaction from additional consumption of that commodity.

The principle of separability of needs is based on a perception that consumers are able to identify broad classes of needs, which are independent or separated from each other. This principle is closely related to the procedural rationality. It allows consumers to divide their income between separate classes of needs and then decide

[13] I must admit that I did not found any microeconomic tax incidence papers. I am inclined to conclude that there is no such a paper since microeconomic effects of taxes are not mentioned in tax incidence passage of most recent survey of Post Keynesian economics (Laramie and Mair (2001)). Hence what is to be said further is simply my own application of Post Keynesian consumer choice to the field of taxation.

separately how and by what commodity the need within a given class of needs is to be satisfied. The principle of separability of needs puts severe restrictions on substitution possibilities which are then possible only within the given class of needs.

The principle of subordination of needs follows from previous principle. It claims that different classes of needs can be ordered by their importance and organized to a pyramid with most basic needs at its base and least important needs at its top. Those need classes are usually organized by Post Keynesians as ranging from physiological needs, safety needs, social needs divided into two sets (belongingness and love on the one hand and self-respect and esteem on the other) to the moral needs. Consumers then behave in such a way that they satisfy needs in the lowest class first and then proceed with rising income to the upper needs.

The principle of growth of needs is the Post Keynesian version of the mainstream requirement of positive marginal utility associated with extra unit of good consumed. While for mainstream economists a consumer always wants more, for Post Keynesians, there is always an extra need which can be satisfied. Therefore, Post Keynesians believe that with rising income consumers do not buy more of everything, instead they believe that consumers buy a constant quantity of goods satisfying lower level needs (those that has been already satisfied) while expanding the range of needs being satisfied.

The principle of nonindependence of needs is based on a perception that consumers do succumb to the influence of marketing, fashion or peer pressure of their neighbours.[14] Post Keynesians hold that many of the needs should be rather called wants since they are determined by society, social standing of individual consumer or by conventions.

From what has been said about the Post Keynesian consumer choice theory it follows that the importance played by substitution effects and relative prices in the mainstream tax analysis is replaced by income effect and absolute prices within the Post Keynesian tax incidence theory. Effect of imposition of a tax on a given commodity depends on its position in the pyramid of needs.

In case of taxed commodity satisfying basic needs, its rising price does not have any effect on the quantity demanded. Instead, due to income effect, commodities satisfying needs that are located higher on the needs pyramid are demanded with a lower quantity. Therefore a tax on basic commodity does not fall on the producers of that commodity with producers of more luxury commodities being punished instead.

---

[14] It is interesting to note that within the mainstream consumer choice theory, the role of marketing and advertisement would be restricted to the supply of relevant information (in case perfect information is assumed not even that) to consumers. Marketing specialists would be probably recruited from economic universities and not from art and creativity schools, as is the reality.

In the case that taxed commodity is located just at the top of the needs currently being satisfied, it can be expected that its rising price will cause changes in demand more similar to those proposed by the mainstream theory. If any substitution effect takes place then it must be among commodities that are to be found within a given class of needs.

From here follows the focus of many Post Keynesians on the effect of taxation on the aggregate effective demand, which is assumed to be main determining force of income growth. Optimal taxation in the Post Keynesian tradition would be that which depresses the effective demand least (or enhances it most), ensuring higher income growth.[15]

Those are the arguments I promised to describe Post Keynesians would put against comprehensive tax base, lower-elasticity-higher-tax-principle and environmentally or health excused taxation. Post Keynesians would consider all those principles as exceptionally detrimental to effective demand while inducing only slight behavioural responses in the aimed-for direction.

Lower-elasticity-higher-tax principle can be replaced by higher-need-higher-tax principle while Post Keynesians would probably claim that environmental or health excused taxes can be effective only if all the goods satisfying needs above the environmentally-unfriendly or unhealthy goods have been "taxed away". As regards comprehensiveness of the tax base, Post Keynesians would probably join the mainstream economists, but would be concerned with comprehensiveness within given needs class only.

[15] Very simple illustration of this point of view is that taxes that fall on lower income classes with proceeds spent on government expenditures or unemployment benefits are from the Post Keynesian perspective pure transfer of funds from one group to another group. Instead, taxes that are paid by higher income classes with proceeds spent on government expenditure have the ability to enhance effective demand since lower income classes in general save lower portion of their income. Thus, taxes imposed on high income classes, through their ability to enhance aggregate effective demand and therefore growth of output can at the end mean higher income even for taxed high income classes.

5. Short-Run Macroeconomic Effects of Taxation

Among Post Keynesian tax incidence models, two basic types can be distinguished. First group of models applies to short-run analysis, while models in the second group are more relevant for the long-run analysis. As already mentioned, those two groups can be divided according to two characteristics. First being whether they make fixed investment assumption and second being whether they assume full utilization of resources in production or not[16], those applicable to short-run being those that assume fixed investment and idle resources.

Kalecki initial contribution

The very first tax incidence paper within Post Keynesian tradition can be thus classified as analyzing short-run effects of taxation. Kalecki (1937b) assumed closed economy with two classes – workers and capitalists – of which only the latter saves out of its income. He further assumed that there are idle resources within the economy ready to be used in production and that investments are fixed due to the fact that current investments are determined by past decisions. He also assumed balanced state budget with taxes financing all the state expenditures, which consist of officials' salaries and the doles of unemployed.

Kalecki went on and introduced a consumption tax into his model.[17] Due to the fact that this tax is treated by firms as a part of prime costs, natural response of capitalists is to mark-up on this new type of prime costs, leaving gross profits and national income unchanged while depressing real wages. The main result of introducing the consumption (wage) tax is, Kalecki concluded, a redistribution of part of real wages from workers to the state officers and the unemployed, on whom government spends additional tax revenue, due to balanced budget assumption.

The effect of introduction of a tax on capitalists' incomes, which are not treated as prime costs, is to increase gross profits by the amount of the income tax, so as to leave profits received by capitalists unchanged. This rather surprising result follows from the fact that government spends additional tax revenue on doles of unemployed and on officials' salaries who, due to the no workers' savings assumption, spend it on purchase of goods or services which brings about the increase in gross profits of corporations. This increase in gross profits leaves profitability of new investment

[16] Despite the call for rejection of models assuming full employment made by Davidson and Weintraub (1978) in their negative definition of Post Keynesian economics, it seems that full-employment assumption in long-run oriented models can be consistent with Post Keynesian world view.

[17] Due to the fact that Kalecki assumed capitalists' consumption to be very small portion of total consumption which can be neglected, consumption tax in his model is equivalent to the tax levied on wages of workers.

unchanged while increasing aggregate effective demand and thus employment with uncertain effect on real wages.

Introduction of capital tax levied on all types of capital has similar effect with the difference that it increases profitability of new investment and has positive impact on real wages. Increase of profitability of new investment is given by the increase in pre-tax profits combined with the fact that tax on capital is not in the long-run part of cost of production. Whether or not a lender lends does not affect amount of tax he pays. Kalecki's conclusion is that this type of the tax offers a most potent instrument for stimulation of any economy while at the same time recognizing that it might not be politically feasible to use this type of taxation on a large scale.

Kalecki's model is interesting also from methodological point of view. As Sawyer (1985) observes, Kalecki differs from orthodox economic theories at least in three ways. First, Kalecki viewed economic environment as inherently non-competitive, which is reflected in his theories as assumption that firms set up their prices as mark-ups over their prime costs. Second, Kalecki never accepted neoclassical notion of equilibrium and third, Kalecki never in his models made use of utility or production function. Despite rather limited modelling apparatus, Kalecki managed to develop models which nicely incorporate microeconomic and macroeconomic aspects. His treatment of price determination and wage formation forms a microeconomic basis of his models and his mechanism of profit or investment determination can be regarded as truly macroeconomic in nature.

Despite the limitations and over-restrictive assumptions of Kalecki's model, it offers a nice illustration of basic mechanisms of Post Keynesian tax incidence models. This basic mechanism is built on the Post Keynesian view of how economy works.

Firms are seen as not-perfectly competitive entities, setting prices as mark-ups over their prime costs. Those prime costs are assumed to be constant over the relevant rage of output and thus, with the assumption of idle resources, an extra output can be arranged in a very short time, resulting in higher profits.

Therefore the tax levied on capitalists' incomes or capital initiates two processes. On one hand, redistribution from capitalists to workers increases effective demand, which creates a room for extra profits to be made by capitalists. On the other hand, capitalists attempt to preserve their profits and therefore increase capacity utilization, hiring more workers and therefore increasing national income.

Since from the Post Keynesian perspective nominal wages are set through the process of negotiations between workers and capitalists, their interplay with changes in prices determines the resulting change in real wages.

Behaviour of prices is determined by two factors. First factor is whether taxes levied are perceived by firms as a part of prime costs. Then firms mark-up the extra

taxes increasing their prices. When taxes are perceived as overheads, then imposition of extra taxes does not result in firms changing their prices.[18] Second factor is whether effective demand is changed as a result of a change in the tax system or not. If effective demand rises as a result of the change of taxation, capitalists will reply partly by changing their output (and thus national income) and partly by increasing their mark-ups and hence prices. Since Post Keynesians treat money supply as endogenous[19], the amount of money in the economy accommodates so as to comply with changed conditions.

Investment decisions taken today, determined by current profits and expectations, constitute the basis for investments in the future. Thus the change in the profits in the short-run offers a clue for long-run analysis. If profits increase in the short-run, profitability of investment increases and thus it can be expected that investments increase in the long-run, increasing national income or the growth rate.

Change in the real wages on the other hand offers a clue for response of trade unions in the long-run. If real wages decrease in the short-run, it can be expected that trade unions will respond in the future attempting to restore the share of wages in national income and thus reverse the negative impact of taxation.

Later developments

Having explained the basic logic of Post Keynesian tax incidence models, it is now interesting to look at conclusions of less restrictive models. One of them is that of Asimakopulos and Burbidge (1974) who investigate short-term impact of consumption taxes, profit taxes, taxes on rentiers' incomes and wage taxes within a model similar to that of Kalecki (1937b). Nevertheless, they expand their model for one more class – rentiers – and assume that government spends the tax revenues on purchase of goods and services while they retain the assumption that workers do not save out of their income. They develop three variants of their model, first assuming perfect competition[20] among firms, second assuming non-competitive setting with firms responding to change in taxation through change in employment and third assuming non-competitive setting

[18] It must be added that some taxes are more likely to be treated as constituting a part of prime costs, commodity ad valorem taxes being a nice example. On the other hand, such taxes as taxes on capital, taxes in distributed profit of firms or environmental taxes are most likely to be treated as overheads. In the case of some taxes, the answer of how they are perceived by firms must be decided empirically on which more will be said later on.

[19] Endogeneity of money supply means that central bank can not influence amount of money in economy. In fact, amount of money in economy is given by demand for it. For description of approaches and rationale for money supply endogeneity, see Hewitson (1995) or Lavoie (1992b) and for elaborated treatment see Dow and Rodriguez-Fuentes (1998).

[20] Perfect competition in Post Keynesian terms which means that firms respond to change in taxation through change in their prices that are formed as mark-ups over the prime costs.

with employment maintained at some predetermined level by an appropriate fiscal policy.

Asimakopulos and Burbidge (1974) investigate the impact of two types of changes in a tax system. First type of change is increase in one type of tax accompanied with decrease of another which leaves original level of government revenue unchanged. Second type of tax change is an increase in some type of a tax with equal increase in government expenditure so as to leave government budget in balance. For the sake of saving space, I reproduce only the results Asimakopulos and Burbidge (1974) received for the second type of the tax change.

Conclusions for the perfect competitive version of the model in which firms respond to the change in taxation through change in prices are summarized in the table no.1.

Table 1: Short-run effect of increase of taxes in perfect competition setting

	Change in				
	Pre-tax profits	Post-tax profits	Rentiers' consumption	Post-tax wage rate	Mark-up
Profit tax	+	0	0	-	+
Wage tax	0	0	0	-	0
Rentiers' income tax	+	+	-	-	+
Consumption tax	0	0	-	-	0

Note: Taken from Asimakopulos and Burbidge (1974) page 276. Assuming matching increase in government expenditure. All variables' changes (except mark-up) in real terms.

Conclusions for the non-competitive version of the model in which firms respond to taxation through change in employment are summarized in the table no.2.

Table 2: Short-run effect of increase of taxes in non-competitive setting

	Change in				
	Pre-tax profits	Post-tax profits	Rentiers' consumption	Post-tax wage rate	Employment and output
Profit tax	+	0	0	0	+
Wage tax	0	0	0	-	0
Rentiers' income tax	+	+	-	0	+
Consumption tax	0	0	-	-	0

Note: Taken from Asimakopulos and Burbidge (1974) page 282. Assuming matching increase in government expenditure. All variables' changes (except employment and output) in real terms.

Note that table 2 would apply for results originally obtained by Kalecki (1937b). Wage or consumption tax do depress post-tax wage while leaving pre-tax and post-tax profits unchanged along with employment and output unchanged. On the other hand, a tax levied on capitalists' profits increases pre-tax profits leaving post-tax profits unchanged while at the same time increasing employment and national output.

Conclusions for the non-competitive version of the model in which government through appropriate fiscal policy achieves certain predetermined level of employment after increase of taxation are summarized in the table no.3.

Table 3: Short-run effect of increase of taxes in non-competitive setting with employment fixed through fiscal policy

	Change in			
	Post-tax profits	Rentiers' consumption	Post-tax wage rate	Budget balance
Profit tax	-	-	0	-
Wage tax	0	0	-	0
Rentiers' income tax	0	-	0	-
Consumption tax	0	-	-	0

Note: Taken from Asimakopulos and Burbidge (1974) page 284. All variables' changes (except budget balance) in real terms.

Though Asimakopulos and Burbidge (1974) model releases some of the original Kalecki's restrictions, it keeps the assumption that firms respond to taxes either by change in prices or capacity utilization. Damania and Mair (1992b) release this restriction and allow for game-theory-like interaction among firms to take place in their model, otherwise based on Asimakopulos and Burbidge (1974).

They assume that firms are able to successfully collude in the long-run keeping output on negotiated level and keeping prices on the higher than competitive level. However, in their model firms are not able to observe the level of aggregate effective demand. Thus increase in effective demand, if met by increase in output by some firms, is considered to be a defection and thus results in a break-up of a cartel. Still, after some time, firms are able to negotiate to collude again and therefore, to decrease their production in order to raise prices.

The working of model in Damania and Mair (1992b) is thus such that if taxation changes the level of effective demand it, besides the traditional tax incidence changes, results in the break-up of firms' collusive behaviour, which is only restored after some time. Main conclusions are again summarized in the table no.4.

Table 4: Short-run effect of increase of taxes in game-theory-like setting

	Change in				
	Pre-tax profits	Post-tax profits	Rentiers' consumption	Post-tax wage rate	Employment and output
Profit tax	+	0	0	-	+
Wage tax	+	+	-	-	+
Rentiers' income tax	0	0	0	-	0

Note: Taken from Damania and Mair (1992b) page 203. Assuming matching increase in government expenditure. All variables' changes (except employment and output) in real terms.

Last noteworthy work investigating incidence of taxes in Post Keynesian tradition is the work of Damania and Mair (1992a) who adapt the original Asimakopulos and Burbidge (1974) model investigating the impact of imposition of business property tax and property tax levied either on rentiers or workers. Again, they specify two versions of their model, one for a competitive case and second for a non-competitive case.

Main conclusions for the competitive version are summarized in the table no.5.

Table 5: Short-run effect of increase of taxes in perfect competition setting

	Change in				
	Pre-tax profits	Post-tax profits	Rentiers' consumption	Post-tax wage rate	Employment and output
Business property tax	+	0	0	-	0
Property tax on rentiers'	+	+	-	-	0
Property tax on workers	0	0	0	-	0

Note: Taken from Damania and Mair (1992a) page 137. Assuming matching increase in government expenditure. All variables' changes (except employment and output) in real terms.

Main conclusions for non-competitive version are summarized in the table no.6.

Table 6: Short-run effect of increase of taxes in non-competitive setting

	Change in				
	Pre-tax profits	Post-tax profits	Rentiers' consumption	Post-tax wage rate	Employment and output
Business property tax	+	+	0	0	+
Property tax on rentiers'	+	0	-	0	+
Property tax on workers	0	+	0	-	0

Note: Taken from Damania and Mair (1992a) page 136. Assuming matching increase in government expenditure. All variables' changes (except employment and output) in real terms.

One of the most striking results of Damania and Mair (1992a) is that if impact of taxes in the non-competitive version of the model is investigated, workers tend to retain their real wages when business or rentiers' property tax is increased. Meanwhile, their real wages decrease as a result of the very same tax changes in the competitive version of the model. The same positive impact of oligopoly setting applies for output and employment. This somewhat striking result for someone raised within the neoclassical tradition, that treats any sign of imperfection in competition very negatively, is due to the fact that Post Keynesian type of competition is assumed. In the competitive case, firms respond to taxation, aiming to retain their profits, simply through rise in their prices, depressing real wages at the same time. Meanwhile, if change in quantity produced and hence amount of labour employed is the response of firms to imposition of taxes (non-competitive case), firms attempt to raise their production in order to preserve their profits and therefore raise national output, part of which goes to workers.

This basic logic also applies to the model of Asimakopulos and Burbidge (1974) with non-competitive behaviour having in general positive impact on wages, employment or output.

Two things are noteworthy about the conclusions expressed above. Note that within the Post Keynesian tax incidence theory, real wages are in general a very vulnerable variable. No matter what type of competition is assumed, imposition of wage tax results in lower real wage. This result by itself would not be very surprising. Nevertheless, real wages tend to decrease also after the imposition of different types of taxes, now this result being dependent on the type of competition assumed.

A second noteworthy feature is exceptional stability of post-tax profits. Only one case in which post-tax profits decreased in above outlined contingencies is the case in

which non-competitive setting is assumed along with imposition of profit tax with government protecting certain level of employment. As an addendum to this, it comes that there does not necessarily have to be a trade-off present in reaching the tax system, which is progressive and promotes economic growth at the same time.

In the mainstream tax incidence theory, those two goals are usually said to contradict each other. Progressive tax system must inevitably depend or rely on taxes that fall on capital, profits or property owned by capitalist or their savings. On the other hand, those taxes are said to be very detrimental to economic growth, since capital is very mobile and thus as a result of imposition of taxes, moves to another country, with the same objection applying to firms on who's profits taxes might be levied.

Taxing the property or savings is said to depress growth perspectives since in the mainstream tax incidence theory such taxes result in lower capital accumulation. This lower capital accumulation on the other hand depresses investments since in the mainstream theory available savings determine the level of investment, not the opposite as Post Keynesians hold.

Longer than short-run, shorter than long-run

Rest of the Post Keynesian work concerned with impact of taxation can be considered to investigate the effect of taxation within long-period framework. There is one exception to this statement and it is the work of Laramie and Mair (1996a) who investigate the impact of taxation on the behaviour of the business cycle.

They take the model of business cycle from Kalecki (1968) who assumes closed economic system without government sector with zero workers' savings and assumes zero change in inventories over the course of the business cycle. For Kalecki (1968) main driving force of the business cycle is cyclical behaviour of investments. New investment orders in his model are given by entrepreneurial savings, prerequisites for their investment and an innovation factor. Such a determined investment orders are eventually with a certain time lag, in the spirit of the Post Keynesian tradition, translated into new investments.

Laramie and Mair (1996a) introduce government sector with balanced budget along with workers' savings into Kalecki's model and investigate the impact of wage and profit taxes on the behaviour of the business cycle. In their model, causal link between cyclical behaviour of investment and the business cycle is preserved. They show that, after accounting for the impact of the tax system, investments are determined by two main factors. First determining factor is the current level of profits and the second determining factor is the rate of depreciation.

Depreciation in their model is used in a different way than it is used in the standard economic literature. Through the division of already installed capital into the old and new one, profits subsequently can be divided into the profits going to the old

equipment and profits going to the new equipment. Higher the level of investment activity and of new equipment, higher is the proportion of profits going to it. Hence, in the spirit of Kalecki (1968), depreciation represents the rate at which profits are lost to existing (old) capital as a result of technical progress.

Laramie and Mair (1996a) go on and show how the taxation impacts on two investment determining factors – profits and depreciation. They are able to specify two versions of their model. First version of the model, called a no-tax-shifting version keeps mark-ups of firms constant with the relation to the tax rates levied, while in the second version, called tax-shifting one, firms' mark-ups are positively related to the profits tax rate and negatively related to the wage tax rate.[21]

Through combination of impact of tax system on the behaviour of profits and the rate of depreciation, Laramie and Mair (1996a) show the overall effect of taxation on the behaviour of the business cycle. Main conclusions are summarized in the table no.7.

Table 7: Impact of increase of wage and profit taxes

No-tax-shifting	Impact on		
	Rate of depreciation	Profits	Amplitude of business cycle
Wage tax	0	-	Reduced
Profits tax	+	+	Augmented
Tax-shifting	**Impact on**		
	Rate of depreciation	Profits	Amplitude of business cycle
Wage tax	+	- (lower relative to no-tax-shifting case)	Reduced (less relative to no-tax-shifting case)
Profits tax	+ (lower relative to no-tax-shifting case)	+ (lower relative to no-tax-shifting case)	Augmented (less relative to no-tax-shifting case)

Note: Summary of result of Laramie and Mair (1996a). Any change that increases the rate of depreciation also leads to increase in national income. Assuming matching increase in government expenditure.

Again, quite the counterintuitive results follow from the Post Keynesian tax incidence analysis. Note that unshifted wage tax decreases profits. The reason for this is already mentioned impact of taxation on aggregate effective demand. In the same spirit, unshifted profits tax increases profits, which is again quite a counterintuitive result.

Noteworthy is also the fact that profit receivers do make themselves worse-off through the attempt to shift the tax on the second income class – wage receivers. Similar conclusion applies for the attempt of wage receivers to shift the tax on profit receivers, which only increases the profits. This conclusion in fact lends support for Post Keynesian advocacy of various forms of cooperation and negotiation among major

[21] Therefore, the term tax-shifting must be treated with caution. For someone skilled in the mainstream tax incidence theory, tax shifting refers to the attempt of the economic agent, on whom the tax is levied, to shift its burden on other economic agents. It is usually used in the context of firms shifting the burden of taxes on other economic agents, since usually firms are liable to send the taxes to government. In context of Laramie and Mair (1996a), the term tax-shifting is used in such a way that it means that profit taxes are being shifted by firms (mark-ups are positively related to profits tax rate), while (and here is the confusing point) wage taxes are shifted by workers (mark-ups are negatively related to wage tax rate).

groups or classes in economy. The principle of suboptimality of aggregated optimal responses known when aggregating individuals extends also to the case of aggregation of optimal one-class responses with unintended results that emerge on the most aggregated level.

The results of Laramie and Mair (1996a) concerned with the impact of taxation on the amplitude of the business cycle are also interesting from the point of view of policy makers since they offer them information when deciding among possible changes in the tax system.

It is also interesting to compare basic conclusions of Laramie and Mair (1996a) about impact of profit and wage taxation on profits with the conclusions of earlier works, especially Asimakopulos and Burbidge (1974) and Damania and Mair (1992b). Reference to table 1 reveals that increase in profit or wage tax leaves post-tax profits intact in Asimakopulos and Burbidge (1974) model and reference to table 4 reveals that increase of profit tax leaves post-tax profits intact while increase in wage tax increase post-tax profit in Damania and Mair (1992b) model. The difference from Laramie and Mair (1996a) is that both earlier works assume zero workers' savings while Laramie and Mair (1996a) derive their results using Weintraub's consumption coefficient.[22] Use of Weintraub's consumption coefficient implies that wage taxation lowers profits and profit taxation increases them in Laramie and Mair (1996a) model.

From the methodological point of view, use of consumption coefficient means implicit assumption that government budget is balanced or, in other words, that government spends all additional tax revenue after increase of taxation. Use of consumption coefficient also implies that effect of taxation on aggregate effective demand is implicitly assumed to play key role in determining macroeconomic incidence of taxation.

At this point, it is possible to identify certain inconsistency of Post Keynesian tax incidence theory. While Laramie and Mair (1996a) hold that increase of wage tax has negative impact on profits and increase in profit tax increases them, in the very similar model, Laramie and Mair (2000) derive exactly opposite results. Reason behind the difference is that the later work does not make use of consumption coefficient.

To reconcile the difference regarding impact of wage taxation, use of consumption coefficient for incidence of wage tax seems rather inappropriate, because

---

[22] Weintraub (1981) showed that the consumption coefficient can be written in the form $a = c_w + c_c \cdot (\pi/V) + \Omega/V$ where π stands for after-tax profits, Ω stands for government transfer payments, V stands for wage and salary income and c_w and c_c are workers' and capitalists' marginal propensity to consume respectively. Assuming that c_c is close to zero and π/V is less than one, Weintraub (1981) showed that a is most likely to be higher than one and in this case it can serve as a good approximation of relation between workers' income and their consumption expenditure.

increase of wage tax presents lower income of part of workers associated with increase of consumption by those to whom government redistributes additional tax revenue. In effect, for increase of wage taxation, aggregate consumption is likely not to change, or in other words, consumption coefficient is most likely to equal unity. If this is in fact the case than increase of wage tax will have no impact on profits, neither negative as in Laramie and Mair (1996a) model, nor positive as in Laramie and Mair (2000) model.

To reconcile the difference regarding impact of profit taxation, use of consumption coefficient in that case seems appropriate, since government through imposition of profit tax and redistribution of additional proceeds to workers increases aggregate consumption and thus profits. In such a case, consumption coefficient will be greater than unity and original results regarding impact of profit taxation on profits outlined in Laramie and Mair (1996a) hold and omission to use consumption coefficient by Laramie and Mair (2000) should be disregarded. Use of original results from Laramie and Mair (1996a) in subsequent work by Mair and Laramie (2000) speaks also in favour of original results.

6. Long-Run Macroeconomic Effects of Taxation

When describing the long-run analysis focused Post Keynesian tax incidence models, one should distinguish between two, more or less independent, traditions. One makes the Cambridge theorem to be its starting point, especially the famous paper by Pasinetti (1962). The second stream of work derives its origins directly from Kalecki, especially from his early 1940's works (Kalecki (1941 and 1942)) and also from the early 1970's article (Kalecki (1971)).

Despite the fact that Pasinetti (1962) refers to Kaldor (1957), who in turn mentions Kalecki (1942)[23], there is no other link between the two traditions to be found. Not even the most recent survey of the Post Keynesian tax incidence theory found in Laramie and Mair (2001) mentions the tradition stemming from Pasinetti (1962).[24] Since I think that both traditions deserve to be introduced, I describe them in turn.

Cambridge theorem tradition

Cambridge theorem based tradition starts with Kaldor (1957). Despite the fact that he only mentions the impact of taxation on distribution of national income, he already captures the basic conclusions that penetrate the most of the Post Keynesian tax incidence theory – exceptional vulnerability of wages with respect to taxation. He derives his theory of distribution, noting that his conclusions are in concordance with conclusions of Kalecki (1942), who's conclusions he summarizes as that *capitalist get what they consume, while workers consume what they get.*

Pasinetti (1962) followed Kaldor and further developed the theory of income distribution, eventually developing famous Cambridge theorem, which, provided that certain existence conditions are satisfied, and under the assumption i) that rate of profit is the same for all classes in economy (no discrimination on the basis of who owns the capital condition); ii) that each class's share of the capital stock is equal to its share of savings (condition that follows from the previous one when long-run steady state is reached); iii) that capitalists' marginal propensity to consume is constant (standard Keynesian saving function condition); and iv) total savings are equal to investment (necessary condition for equilibrium) states, that on the long-run equilibrium growth path, the rate of profit, r, is given by natural rate of growth, g_n, divided by capitalists' propensity to save, s_c, independent of anything else, i.e.

---

[23] It is true that Kaldor (1957) mentions Kalecki (1942) as his inspirational source, nevertheless, he criticizes Kalecki for his theories based on mark-up pricing in the same paper. Since the work stemming from Kalecki (1941, 1942 and 1971) takes mark-up pricing as one of the fundamental principles, it can be said that those two traditions are independent at best.

[24] In the same spirit, Laramie and Mair (2000), the only Post Keynesian tax incidence book, does not mention tradition originating with Pasinetti (1962).

$$r = \frac{1}{s_c} \cdot g_n \qquad (1).$$

Cambridge theorem can also be expressed as

$$\frac{P_c}{Y} = \frac{1}{s_c - s_w} \cdot \frac{I}{Y} - \frac{s_w}{s_c - s_w} \quad \text{and} \quad \frac{P_c}{K} = \frac{1}{s_c - s_w} \cdot \frac{I}{K} - \frac{s_w}{s_c - s_w} \cdot \frac{Y}{K} \qquad (2)$$

$$\frac{P}{Y} = \frac{1}{s_c} \cdot \frac{I}{Y} \quad \text{and} \quad \frac{P}{K} = \frac{1}{s_c} \cdot \frac{I}{K} \qquad (3)$$

where P_c stands for profits received by capitalists, P stands for profits, Y stands for national income, s_w is saving propensity of workers, I stands for investments and K stands for capital. As can be seen from equation (3), saving behaviour of capitalists determines share of profits in national income on the one hand and profitability of investments (profits over capital) on the other. As Pasinetti (1962) points out, his conclusions are valid, no matter into how many classes and according to what characteristics economy is divided.

One of the direct conclusions of Cambridge theorem is that profits to savings ratio of capitalists must be equal to profits received by workers, P_w, over their savings, S_w, i.e.

$$\frac{P_c}{S_c} = \frac{P_w}{S_w} \qquad (4)$$

and since capitalists are the only class in the economy that receives major part of its income from profits, their saving behaviour determines the ratio expressed in (4). All this is only a complicated way of saying that workers always receive the profits in such an amount so as to bring the ratio of their profits to their savings to the value set by the behaviour of capitalists, with the share of wages in national income determined as the complement to profits share determined in (3). The only way for workers to receive more than by capitalists determined wage share is to make additional saving and thus gain part of the profit share through investment activity.

It can be objected that capitalists-workers division of economy applies more to old time capitalism with firms owned by capitalists, not for modern form of capitalism, where firms are owned by large numbers of shareholders. As Eichner and Kregel (1975) note, Cambridge theorem still holds when saving behaviour of capitalists is replaced with dividend payout policy of large corporations or with pricing behaviour that alternates the mark-up so as to leave internal funds of large corporations at the same level. No matter what form of saving behaviour of large corporations is assumed, it still determines the share of profits in national income, profitability of investments (profits over capital) and profits over savings ratio.

The original Pasinetti's result generated quite a considerable amount of literature, which can be divided into two streams. First type of responses, originating predominantly in neoclassical camp, tried to prove that Cambridge theorem does not hold. Among early critical responses, those of Samuelson and Modigliani (1966a)[25], Meade (1966) or Maneschi (1974) are probably the most well known.

Second type of responses tried to expand original Pasinetti's model through releasing his original assumptions. Within this stream Steedman (1972) showed that the Cambridge theorem continues to hold, when accounting for government sector with the balanced budget. If original Pasinetti's model is expanded for taxes levied on wages, t_w, taxes levied on profits, t_p, and consumption tax levied on all consumption goods, t_i, Steedman (1972) showed, that the Cambridge theorem still can be expressed as

$$r \cdot \left(1 - t_p\right) = \frac{1}{s_c} \cdot g_n \tag{5}$$

which states that the long-run rate of profits, r, corrected for the tax levied on profits, $1 - t_p$, is determined by natural rate of growth, g_n, divided by the saving propensity of capitalists, s_c, independent of anything else.

In his additional article, Pasinetti (1989) showed that Cambridge theorem still holds even if unbalanced budget is assumed, given that government deficit is financed by money creation or given that Ricardian equivalence holds. In this case Cambridge theorem takes on the form of

$$r = \frac{1}{s_c'} \cdot g_n \tag{6}$$

with exactly the same meaning, only with s_c' being interpreted as capitalists' propensity to save corrected for both, the effect of taxation of profits and for effect of government deficit spending. From his analysis, Pasinetti (1989) concludes that wages are vulnerable not only to taxation, but to government deficit spending as well.

To oversimplifying Pasinetti's assumptions, work in Dalziel (1991a) and Dalziel (1991b) respond through first showing simplified derivation of Cambridge theorem and second and most importantly, showing that Cambridge theorem holds for the case in which government budget is assumed to be unbalanced and neither of Pasinetti's assumptions is made, i.e. neither the deficit financed by money creation assumption is made, nor Ricardian equivalence is assumed to hold. In this case,

[25] In fact, probably most interesting on the whole debate is the sequence of critical remarks and responses published in 1966 in the Review of Economic studies, starting with Samuelson and Modigliani (1966a), through response of Pasinetti (1966b), Robinson (1966) and Kaldor (1966) and the counter-response of Samuelson and Modigliani (1966b).

Dalziel (1991b) showed that Cambridge theorem still holds in the form expressed in equation (5).

Dalziel's work is important because it completed the process in which different assumptions have been released and the exceptional robustness of Cambridge theorem has still been confirmed.

Last contribution to the tradition based on Cambridge theorem is the article of O'Connell (1995) who investigates the effect of introduction of the indirect taxes into the original Pasinetti's model while dividing those taxes into the taxes levied on consumption goods on the one hand and taxes levied on investment goods on the other. O'Connell shows that original Kaldor (1957) proposition that all taxes are paid out of wages holds strictly only if the rate of tax levied on consumption goods equals to the rate of tax levied on investment goods, independent of the government budget stance.

Besides this result, he adds two more propositions. First being that introduction of government sectors lowers the consumption on the part of workers by the amount of government consumption in one to one relation only if capitalists do not consume. The effect of accounting for capitalists' consumption is to improve the position of workers slightly, however, not reversing the basic conclusion.

Second O'Connell's proposition is that if government deficits are assumed to be debt financed, additional profits paid out by government in the form of interest payments go predominantly to capitalists as their additional income.

Again, extra vulnerability of wages to taxation, government consumption or capitalists' behaviour has to be noticed. This basic message of the Post Keynesian tax incidence theory does not change when we look at the tradition stemming from Kalecki's work. However, works originating from Kalecki do have the advantage of being somehow more explicit about the impact of different taxes on different variables of concern than somewhat very aggregated framework of the Cambridge theorem.

Kalecki tradition

One of the first articles claiming to be influenced by Kalecki's distribution and tax incidence theory within the Post Keynesian tax incidence tradition is that of Laramie (1991) who integrates both Kalecki's theories and investigates the impact of method of raising governmental revenues on the distribution of value added among wages, salaries and profits. Laramie (1991) assumes the economy operating below its full capacity, with firms determining the prices as mark-ups over their prime costs, with mark-ups given by institutional factors such as degree of industrial concentration, product differentiation, trade union activity or the level of overheads.

Laramie (1991) assuming that firms treat taxes as overheads first derives Kalecki's equation originally used to show that taxation has no impact on the level of

national income in the form

$$Y = \frac{\beta \cdot a + I + G + X - M}{1 - a \cdot \alpha} \tag{7}$$

where Y stands for national income, β stands for salaries which are part of overheads, a stands for Weintraub's consumption coefficient, I stands for gross investment, G stands for government purchases, X stands for exports, M stands for imports and α stands for wage's share of value added.

Original Kalecki's assumptions were such that for taxation in order to have any impact on the level of national income, government purchases G must change after the change in the tax system. The reason for this was that Kalecki assumed distribution factor α and salaries β to be constant. However, taxation in the long-run is likely to impact on the level of salaries and on the wage share, which presents an additional channel through which taxation can influence national income.

Laramie (1991) than goes on and investigates this distribution factor channel. He incorporates taxes on wages, consumption expenditures, salaries, distributed and gross profits into his model. In order to keep his analysis tractable, he combines the taxes (along with consumption propensities out of different forms of income) into three general tax parameters describing level of taxation falling on wage receivers, t'_w, salary receivers, t'_β, and profit earners, t'_π, and investigates how changes in those tax parameters influence the distribution of national income between wages, profits and taxes, finally combining those effects into overall impact on the level of national income. Summary of his conclusions is shown in the table no.8.

Table 8: Impact of change in taxation on distribution factors and national income

	Impact on			
	Profit share, π/Y	Wage share, α	Tax share, T/Y	National income
Rise in t'_w	-	-	+	-
Rise in t'_β	-	-	+	-
Rise in t'_π (taxes treated as overheads)	-	0	+	+
Rise in t'_π (taxes treated as prime costs)	0	-	+	-

Note: Summary of results from Laramie (1991). Assuming matching increase in government expenditure. T stands for sum of tax revenues and π stands for after-tax profits.

The result that emerges from the investigation of impact of taxation on distribution factors confirms again the increased vulnerability of wages to the

imposition of taxes. Rise in taxes levied on wages or salaries[26] not only depresses its share in the national income, but also due to its effect on aggregate effective demand depresses level of national income despite the change in government spending.

Interesting point is the reversal of impact of profit taxation on national income, depending on whether firms treat taxes as overhead or prime costs. The reason for this is that if firms treat taxes as prime costs, their response to the increase in taxation is to raise prices preserving profit share in national income while depressing effective demand and thus national income, despite the increase in government purchases. On the other hand, when firms treat taxes as part of their overhead costs, their response to change in profit taxation is not to change prices allowing for increased government spending to push national income to a higher level.

Dichotomy of results of profit taxation on national income depending on firms' treatment of taxation is discouraging since it allows any analysis to yield opposing, model or assumption specific results. It must be said that different forms of taxes are more or less likely to be treated as a certain type of costs by firms. For example, ad valorem taxes or commodity taxes in general are perfect candidates for as-prime-costs-treated forms of taxation. Natural candidates for as-overhead-costs-treated taxes would than be all forms of direct taxes such as corporate income taxes.

Besides the difference in various forms of taxes to be treated differently, the question of how firms treat taxation can be decided empirically. Since for Laramie (1991), taxes levied on profit receivers are represented mainly by business income taxation, Laramie and Mair (1993) conduct thorough empirical investigation aiming to answer the question of how firms respond to changes in taxes levied on their profits with respect to their prices. They regress aggregated and also industry specific price-cost margins on business tax rates, using data for United Kingdom and covering the 1979 through 1986 period, reaching the conclusion that this form of taxes is treated by firms as part of their overhead costs, not as the part of their prime costs. This conclusion based on empirical analysis sheds a new light on the use business income taxation since it has the potential to increase level of national income, due to already mentioned effect on aggregate effective demand, which is not swept by the increase in the price level.

Since the conclusions of Post Keynesian tax incidence theory in the long-run with respect to profits taxation seems to depend on specific assumptions about the treatment of taxes by firms, Mott and Slattery (1994) construct a model which allows

---

[26] Note that rise in the level of taxes levied on wages, t'_w, or on salaries, t'_β, can reflect not only the rise in direct taxes levied on wages or salaries, but can reflect also the rise in indirect taxes such as commodity taxes as well.

them to investigate the impact of imposition of various taxes on after-tax wages and profits and on national income given four different forms of pricing behaviour of firms.

They construct the model in the spirit of Kalecki and Kaldor. Their model assumes an economy to operate bellow the level of full employment with equilibrium given by investment equal to saving condition. They investigate the impact of imposition of profit, commodity or wage taxes assuming that government spends all the additional tax revenue on the purchase of consumption goods.

Within their model, four different forms of pricing behaviour can be modelled. First form of pricing behaviour with respect to taxes is their no-tax-shifting case, which corresponds to firms treating taxes as part of their overhead costs. Other possible responses emerge when firms add part of the perceived tax per unit of output to the price of their output, when firms attempt to mark-up on the tax or when firms add the perceived tax rate to their mark-up.

Exact conclusions of Mott and Slattery (1994) depend on two additional assumptions. Their results change whether or not workers are assumed to save and whether or not saving propensity out of profit income, s_π [27], is assumed to be higher than slope of curve linking investments with profits, λ [28].

The summary of results of impact of tax system on wages, profits and national income for specific set of assumptions Mott and Slattery (1994) explicitly state as their preferred is in the table no.9.

Table 9: Impact of taxation on wages, profits and national income

	Impact on		
	After-tax profits (real terms)	After-tax wages (real terms)	National income
Rise in wage tax	0	-	0
Rise in consumption tax	0	+	+
Rise in profit tax	0	+	+

Note: Summary of results taken from Mott and Slattery (1994). Results for assumption of zero or very low workers' savings and for $s_\pi > \lambda$. *Assuming matching increase in government expenditure.*

As Mott and Slattery (1994) note, their results change only quantitatively not qualitatively when different forms of firms' pricing behaviour are considered. Again,

[27] It is interesting to note, that earlier works in the Post Keynesian tradition worked predominantly with saving and consumption propensities of capitalists, denoted usually as s_c or c_c while modern-day Post Keynesians speak more often about the saving or consumption propensities out of profit income, denoted usually as s_π or c_π.

[28] Mott and Slattery (1994) specify investment equation in the form $p \cdot I = I_0 + \lambda \cdot \Pi_n$ where p stands for price level, Π_n stands for nominal after-tax profits, I stands for real investment level with autonomous part, I_0, and induced part, $\lambda \cdot \Pi_n$ where coefficient λ determines the part of an extra after-tax profits which is being reinvested.

their analysis offers some form of profit taxation as a natural policy implication. In their analysis, profit taxes have the advantage of increasing national income and share of wages in national income, while leaving share of profits in national income unchanged.

Since business taxes emerge repeatedly from the Post Keynesian tax incidence theory as first-best solution, it has been subject to even more profound investigation. Laramie (1994) constructs a model based on Kalecki (1968) and investigates the impact of profit taxation on level of profits and national income in the long-run.

His analysis revealed that the impact of business taxes depends on two basic determinants. First determining factor is the government budget stance with respect to imposition of business taxes. Second determining factor is the private sector response which consists of i) the reaction of personal saving to the tax and budget stance; ii) the reaction of investment to the tax in the long period; and iii) the change in corporate mark-ups with respect to the tax.

After the imposition of business tax, corporate profits fall by the full amount of additional tax revenue if there is no change in government spending (government uses the revenues to increase budget surplus or to decrease budget deficit), no change in mark-ups and no change in personal saving. In such a situation, investment expectations of entrepreneurs fall, causing investment activity to fall along with national income over the long-run.

On the other hand, if government keeps a balanced budget (spends all additional revenues on purchase of consumption goods), firms react to business taxes through increase in mark-ups or if personal savings decline (due to rise in the mark-ups and hence price level), profits might even rise after the imposition of business tax. This would increase profitability of future investment and thus national income over the long-run.

Laramie (1994) argues, that private sector reaction – second determining factor of incidence of corporate profits tax – is relatively weak and thus holds that the major determinant of effect of corporate taxation is the government budget stance. It comes as a corollary that incidence of corporate taxation depends not on economic, but rather on political factors.

Although the effect of taxation on distribution of national income and on the level of profits and wages after the relevant changes in investment activity can be seen to cover quite a long period, the taxes can be investigated with respect to even more long-run oriented concepts.

This is what Laramie and Mair (2003) do when they alter model of Kalecki (1968) in order to investigate the impact of wage and profit taxation under balanced budget and less than full employment assumptions on trend component of

fixed investment, trend rate of growth of capital stock and trend rate of capacity utilization.[29]

Since the impact of taxation on trended variables in their model is indeterminate, Laramie and Mair (2003) consider conditions sufficient for taxation to have positive impact on their variables of concern.

Sufficient condition for profit taxation to have positive impact on trend level of investment, trend rate of growth in capital stock and trend capacity utilization is for profit tax not to be shifted and for workers' saving to be equal to zero. If profit tax is shifted and workers save, those positive effects are dampened and impact of profit taxation can eventually become negative.

Sufficient condition for wage taxation to have no impact on trend level of investment and trend rate of growth in capital stock is for wage tax not to be shifted and for workers not to save. If wage tax is shifted and workers do save, impact of wage taxation on trend of investment and capital accumulation might be negative.

Sufficient condition for wage taxation to have positive impact on trend rate of capacity utilization is for wage tax not to be shifted and for workers to save. If the wage tax is shifted, the effect of wage taxation on trend rate of capacity utilization becomes indeterminate and might even be negative.

Although Laramie and Mair (2003) do not offer so clear-cut results which would support profit taxation in place of wage taxation as earlier Post Keynesian tax incidence analyses, in their model wage taxation, at best, has no negative impact on investment and capital accumulation. On the other hand, profit taxation has the perspective to have positive impact on those variables, which would speak for its use instead of taxes levied on wages.

So much is to be said about Post Keynesian tax incidence theory, about its origins, conclusions and methodological approach. In what follows, I shall put it into the context of empirical observations of real world phenomena and outline its possible extensions.

[29] The model of Laramie and Mair (2003) is basically a modified version of Laramie and Mair (1996a) model expanded for the effect of changes in the gearing ratio (defined as the ratio of firms' total liabilities to their net worth) and in the capacity utilization rate on investment.

7. Empirical Tests and further Implications

In this section I would like to briefly describe the empirical work related to taxation within the Post Keynesian tradition and illustrate how the Post Keynesian tax incidence theory can be expanded into different areas or can be used to analyze issues not directly related to tax incidence theory. It must be noted that the Post Keynesian tax incidence theory is quite rich in empirical work, at least relatively to other Post Keynesian areas of work. One of the reasons might be already mentioned fact that the Post Keynesian tax incidence theory concerned with impact of taxes on distribution of national income is relatively easy to test empirically.

Empirical tests of the Post Keynesian tax incidence theory

Among the first empirical investigations of tax related issues is already mentioned work of Laramie and Mair (1993) who attempt to answer the question whether firms treat corporate business taxes as part of their prime or overhead costs. Their conclusion based on United Kingdom data covering the 1979 through 1986 period is that firms treat taxes paid as part of their overhead costs and therefore that imposition of profit taxation has the potential to increase national income and wage share in national income.

Also the work of Laramie (1994) contains a part aimed to confirm the conclusions of his model. He investigates the behaviour of post-tax corporate profits, corporate profits share of GDP and corporate profit tax share of GDP using data for United States covering the period from 1947 through 1991. His findings support the view that firms are able to shift the part of corporate profit taxes and that government budget stance is important and thus within the context of his model, if government spends extra revenues raised through corporate profit taxation in the form of its increased consumption, corporate profit taxation has the potential to increase the investment activity and thus national income.[30] There is one shortage of work in Laramie (1994) and it is the fact that he does not investigate importance of his second determining factor – private sector response – he claims to be minor.

This shortage is corrected in Laramie and Mair (1996b) and in Laramie and Mair (1997). Both works expand the Post Keynesian tax incidence theory in such a way that it can be used in the context of federal system, first work concerned with the United States and second work concerned with the European Union. However both papers do

[30] Although in the light of Laramie and Mair (2003) results, the identification of shifting of corporate profit taxation would offer a room for this form of taxation to have negative impact on trend level of investment, trend rate of capital accumulation and trend rate of capacity utilization, Laramie (1994) holds that the extent of tax shifting plays only a minor role, with government budget stance to be the main one.

estimate empirically the strength of private sector responses with respect to the incidence of corporate profits taxation. Their findings confirm original Laramie (1994) claim that private sector responses are rather weak and thus government budget stance present the key factor that determines the impact of profit taxes on profits and thus on national income.

Another test of the Post Keynesian tax incidence theory is that found in Laramie, Mair, Miller and Stratopoulos (1996) who investigate the impact of wage and profit taxation on the investment activity on the data for the United States covering the 1980 through 1991 period. Their basic conclusion is that increase in wage taxes depresses the investment activity due to their negative impact on aggregate effective demand. On the other hand, basic finding concerning the impact of profit taxation is that this form of tax does not have any impact on investment activity due to its positive impact on aggregate effective demand that translates into force going in the opposite direction to profit taxation.

Their findings again shed new light on the often held view of mainstream economists that there is an inherent trade-off between accumulation and redistributional government policies. Mainstream economists hold that redistributive taxes are those levied on profits and that those taxes through their detrimental impact on investment activity depress economic growth in the long-run. For Post Keynesians no such conflict exists. Redistributive taxes have no pronounced impact on accumulation and economic growth, to the contrary, such taxes are able to support aggregate effective demand and thus increase national output.

Taxation and nature of capitalism

The empirical work stemming from Laramie and Mair (1996a) investigation of effect of taxation on the behaviour of the business cycle is that of Mair and Laramie (2000) who relate Schumpeterian claim that recessions function as a form of creative destruction that makes economic system healthier.

Therefore, Mair and Laramie (2000) relate recent trends in tax systems associated with globalization and tax competition (heavier reliance on wage taxation and lower reliance in corporate or capital taxation) with its impact on the behaviours of business cycle. As can be recalled with reference to Laramie and Mair (1996a), increase in wage taxes does not reduce the amplitude of business cycle (ensures Schumpeterian creative destruction process) and increases depreciation (increases investment activity)

only if this tax is shifted.[31] Therefore, Mair and Laramie (2000) look at the behaviour of wage share and investment activity in the United Kingdom over the 1980 through 1996 period and argue that the decline in investment activity[32] is due to the loss of ability of business cycle to ensure creative destruction process since over the same period wage share in national income has declined by more than 10 % (wage taxes were not shifted).

This partly confirms prediction of Kalecki (1941) who claimed that wage share in national income is likely to fall in later stages of capitalism as a result of rise of monopoly power of large firms. Within the light of the Post Keynesian tax incidence theory this is likely to have the similar effect as the rise in wage taxation due to increase in the overall price level. This in turn would influence the profitability of future investments due to the negative impact on aggregate effective demand and would therefore lead to lower growth of output.

Post Keynesian tax incidence theory in multi-country setup

As already noted, Post Keynesian tax incidence theory can be expanded in such a way that it can be used in the context of more than one country. In this respect, Laramie and Mair (1996b) offer novel view on the tax issues in the United States and Laramie and Mair (1997) in the European Union. Their reasoning is such that tax competition among separate states within federal system is likely to make them to rely on wage taxation to provide revenues needed. Since wage taxation replacing the profit taxation has been always viewed by Post Keynesians as a step back, natural policy conclusion is that corporate taxes should be levied on the federal level in order to limit the tax competition among separate states and the funds needed should be transferred from federal to state government in the form of grants-in-aid. Similar reasoning applies to European Union, where natural policy advice would be heavier reliance on central government with unified tax systems and transfer of tax revenues to individual states.

We have already seen that tax incidence for Post Keynesians might be partially given not by economic factors but by political considerations, in other words, incidence of taxes might differ according to whether government spends additional tax revenues or uses them to increase budget surplus. Therefore combination of non-existing taxes levied at the federal level in the European Union with limit put on government spending

[31] Again special reference must be made to the meaning of tax shifting when wage taxes are under discussion. For wage taxes to be shifted, imposition or increase in wage taxation must not be accompanied with fall in wage share in national income as this would signify that wage tax in fact have fallen on workers. On the other hand, if wage tax is fully shifted, wage share in national income does not change and this signifies that this tax is in fact paid out of profit share in national income.

[32] Their data show that manufacturing investment in the United Kingdom at 1990 prices were the same in 1980 as in 1996, which is rather striking result given the growth in economy over the same period.

by Stability and Growth Pact constitute rather unfortunate combination for Post Keynesians.[33]

Laramie and Mair (2000, chapter 7) then further expand Post Keynesian treatment of taxation in the multi-country setup and illustrate their conclusions using two-country model assuming workers do not save, no change in firms' mark-ups after change in taxation and no change in investments after change in taxation so that their model can be regarded as capturing short-term effects only. Laramie and Mair (2000) investigate effect of increase in profit and wage tax in one country only or in both countries simultaneously. They show the impact of change in taxation on sum of national outputs in both countries, y, on sum of pre-tax profits in both countries, π, on sum of after-tax profits in both countries, p, and on share of wages to national outputs in both countries, α. Results of their example are reproduced in the table no.10.

Table 10: Incidence of taxes in two-country model

	Assuming matching increase in government expenditure				Assuming no change in government expenditure			
Increase of	y	π	p	α	y	π	p	α
Wage tax in both countries	0	0	0	0	-	-	-	0
Profit tax in both countries	+	+	-	+	0	0	-	0
Wage tax in one country	0	0	0	0	-	0	-	0
Profit tax in one country	+	+	-	+	0	0	-	0

Note: Summary of results of Laramie and Mair (2000), chapter 7.

What is clearly apparent from the table is importance of government budget stance for the incidence of taxes. While there is no possibility for increase of national output with no change in government purchases after the increase of any type of tax, when government follows with its consumption accordingly after increase of profit tax, national output will improve.

Table 10 also captures the current European setup when there is no taxation on the federal level and thus European governments compete for companies though lowering of corporate taxation.[34] At the same time, being constrained by Stability and Growth Pact means that the very same governments must seek other sources of revenue,

[33] Though European Union is not the federal state, with regard to taxation it can be treated as one with federal-level taxes being nearly nonexistent. For critique of Stability and Growth Pact based on the Post Keynesian mode of thinking and for alternative proposal, see for example Arestis, McCauley and Sawyer (2001). There are another sources of call for stronger federalization of Europe, originating from mainstream economists. Sala-I-Martin and Sachs (1992) and Bayoumi and Masson (1995) criticize lack of federal taxation holding that it does not provide stabilization function for European economy. See Fatás (1998) for counter argument.

[34] According to European Commission (2004), top statutory tax rate on corporate income decreased from average 38 % in 1995 to average 32 % in 2004 in old European Union member states and from average 31 % in 1995 to average 22 % in 2004 in new European Union member states.

labour income taxation being usually the option. In this respect, first row of the table 10 and its right part applies with lower national income on the aggregate level and lower pre-tax and after-tax profits being the result.

Double dividend hypothesis

Last illustration of the Post Keynesian tax incidence theory is to be found in Perry (2001) who investigates so called *double dividend* hypothesis. Double dividend hypothesis stems from the mainstream-based environmental economics. The basic logic is that imposition of tax on environmentally detrimental or harmful products or technologies forces producers to shift to more ecological forms of production, forces consumers to substitute to more environmental friendly products and if government adopts fiscally neutral stance, using the revenues to finance reduction in wage or profit taxation, additional effect namely increase in investment, employment or growth may emerge.

Perry (2001) attacks double dividend hypothesis on several grounds. First major objection is that the Post Keynesians do not consider substitution effects on the part of consumers to be exceptionally strong. Second objection is that substitution among different technologies within production is doubtful given the Post Keynesian perspective. Third objection is that fiscally neutral cut in profit taxation is not likely to have any pronounced impact on investment activity and growth of income. Therefore Perry (2001) holds that the emergence of double dividend effects is doubtful after the introduction of taxes based on environmental considerations. A factor that would increase the probability of double dividend effects to emerge would be the cut in wage taxation, which would increase effective demand and therefore growth prospects. However, emergence of substitution effect on the side of consumers is unsure no matter which tax is lowered in order to ensure fiscal neutrality.

In this respect, Post Keynesian theory again differs from mainstream theory. Post Keynesians would hold that double dividend is most likely to emerge when environmental taxation is introduced and labour income taxes are lowered accordingly. At the same time, Post Keynesians would not favour introduction of environmental taxes on consumption since such taxes have ability to depress aggregate effective demand and render double dividend nonexistent. Instead, direct environmental taxes on firms and companies would be regarded as an optimal alternative.

Opposite holds for the mainstream theory which would see avenue for double dividend to emerge in the introduction of environmental taxes on consumption with the parallel cut in corporate taxation.

Needles to say, some mainstream economists are also sceptical about the possibility of double dividend to emerge. For example recent survey of environmental taxation and regulation in Handbook of Public Economics written by Bovenberg and

Goulder (2002) is rather sceptical about the likelihood of double dividend associated with the introduction of environmental taxation.

To find out what mainstream economists and mainstream theory think about range of other important issues and to contracts their views with those of Post Keynesians, I shall proceed to the subsequent part.

8. Post Keynesian vs. Mainstream Tax Incidence Theory

In this section, I aim to directly confront Post Keynesian and mainstream tax incidence theories. Key purpose is to describe key differences in methodological approach as well as in conclusions reached. In doing so, two principle complications arise.

First, list of topics and issues covered by the mainstream tax incidence theory is seemingly endless, with some topics covered only partially without any clear cut results and without already established set off stylized facts. Moreover, some topics covered by the mainstream tax incidence theory can be regarded only as peripheral and only of minor importance. For those reasons, I picked issues which attracted adequate attention among mainstream economists with associated thorough analysis and where the mainstream theory already converged to some sort of consent regarding basic findings, in other words, where one can speak about already established stylized facts.

Although selection of issues to be tackled might seem arbitrary, I believe that they fulfil above mentioned criteria and also that those issues can be regarded as of adequate importance. First one is the area of corporate taxation which attracted considerable attention among mainstream economists at least since the seminal paper of Harberger (1962). Second topic to be covered is concerned with the effect of taxation on savings and third topic will deal with the effect of taxation on investment behaviour. Both topics may be regarded important since both, savings and investments, are often cited as an important causes or co-determinants of economic growth. For that reason, fourth topic to be covered is the effect of taxation on economic growth.

Second complication that has to be solved when contrasting Post Keynesian and mainstream tax incidence theories is what in fact can be regarded as characteristic representation of the mainstream tax incidence theory. Since the mainstream tax incidence theory is abundant in contributions based often on different classes of models and since the mainstream tax incidence empirics supplies often inconclusive or opposing results, this complication is rather severe. For this reason, I opted for *Handbook of Public Economics* description of mainstream tax incidence.

Advantage of working with Handbook is that its chapters concerned with different topics are written by leading economists in relevant areas and present both, theoretical and empirical, state-of-the-art developments on adequate level of difficulty by the date of publication. Besides already mentioned contribution of Bovenberg and Goulder (2002) describing mainstream approach to environmental taxation, volumes III and IV of Handbook of Public Economics published in 2002 (Auerbach and Feldstein (2002a and 2002b)) contain three chapters of interest. First is the description of theory of the effects of taxation on saving by Bernheim (2002), second is chapter covering the effects of taxation on investment by Hassett and Hubbard (2002) and last is

the chapter on tax incidence by Fullerton and Metcalf (2002b).[35] However, in some instances, I still prefer to work with original articles to which just mentioned authors refer.

Corporate taxation

Corporate taxation attracted immense attention among mainstream economists after publication of seminal paper of Harberger (1962) which introduced basic framework for analysis of corporate taxation. Original model is build so as to analyze impact of corporate income taxation on capital. In the model, economy is divided into two sectors, corporate, supplying good x and non-corporate, supplying good y. Both sectors use labour, L_i, and capital, K_i, where $i = x, y$ according to sector where labour or capital is used in the production.

Under set of simplifying assumptions which include closed economy, balanced government budget with additional tax proceeds spent in neutral manner, constant returns to scale and fixed overall stock of both labour and capital[36], Harberger (1962) derived equation capturing effect of tax on capital levied in corporate sector, T_{kx}, on its price, P_K, in the form

$$\partial P_K = \frac{E \cdot f_K \cdot \left(\frac{K_x}{K_y} - \frac{L_x}{L_y} \right) + S_x \cdot \left(\frac{f_L \cdot K_x}{K_y} + \frac{f_K \cdot L_x}{L_y} \right)}{E \cdot \left(g_K - f_K \right) \cdot \left(\frac{K_x}{K_y} - \frac{L_x}{L_y} \right) - S_y - S_x \cdot \left(\frac{f_L \cdot K_x}{K_y} + \frac{f_K \cdot L_x}{L_y} \right)} \cdot T_{kx} \qquad (8)$$

where E is the price elasticity of demand for x, S_i for $i = x, y$ is the elasticity of substitution of factors of production used in the production of good i, f_i for $i = K, L$ is original (pre-tax) share of factor i in the price of x and g_K is original share of capital in the price of y.[37]

---

[35] Fullerton and Metcalf (2002b) chapter on tax incidence is the revised version of Fullerton and Metcalf (2002a) and follows in Handbook of Public Economics chapter on tax incidence written by Kotlikoff and Summers (1987). For early survey of mainstream tax incidence theory see Mieszkowski (1969).

[36] Sum of capital used in production of x, K_x, with capital used in production of y, K_y, is $K = K_x + K_y$ where K is fixed by assumption. Similar assumption applies to total stock of labour in the economy, $L = L_x + L_y$.

[37] More specifically, $f_L = L_x / \left(K_x + L_x \right)$, $f_K = K_x / \left(K_x + L_x \right)$ and $g_K = K_y / \left(K_y + L_y \right)$. In other words, if $f_K > f_L$, corporate sector is capital intensive. Similarly, when $f_K > g_K$, corporate sector is more capital intensive relative to non-corporate sector. Note also that $f_L + f_K = 1$.

Assuming a no-tax starting position, corporate taxation falls more heavily on capital than is its original contribution to national income whenever $\partial P_K < 0$ and corporate taxation falls more heavily on labour whenever $\partial P_K > 0$.[38]

Denoting first term in the numerator of (8) as $E \cdot f_K \cdot \left(\frac{K_x}{K_y} - \frac{L_x}{L_y} \right) = f_K A$, second term in the numerator of (8) as $S_x \cdot \left(\frac{f_L \cdot K_x}{K_y} + \frac{f_K \cdot L_x}{L_y} \right) = S_x B$ and denominator of (8) as D, equation (8) can be written as

$$\partial P_K = \frac{\left(f_K A + S_x B \right)}{D} \cdot T_{kx} \qquad (8').$$

Furthermore, as shown in Mieszkowski (1967), when effect of tax on labour imposed on corporate industry, T_{lx}, is to be investigated, Harberger's model can be modified and equation (8) becomes

$$\partial P_K = \frac{\left(f_L A - S_x B \right)}{D} \cdot T_{lx} \qquad (9)$$

and when commodity tax on production of corporate sector, T_x, is imposed, equation (8) becomes

$$\partial P_K = \frac{A}{D} \cdot T_x \qquad (10).$$

In conjunction to Harberger's model and its extensions, first issue arises whether it could be accepted by Post Keynesians as a basis for their tax incidence analysis or not. In this respect, answer is certainly *no*. From Post Keynesian perspective, Harberger errs since the beginning of construction of his model in starting from false methodological presumptions and also in making for Post Keynesians not acceptable assumptions. From the methodological point of view, a model based on marginal productivity theory is clearly not acceptable for Post Keynesians, as well as reliance on elasticity of demand for production of corporate sector and elasticity of substitution of factors of production in both sector of the economy. As regards assumptions made, fixed aggregate supply of factors of production is certainly not a realistic assumption and thus degrades whole model in the eyes of Post Keynesians.

Where Harberger (1962) also differs from the Post Keynesian tax incidence theory is in his estimates of tax incidence of corporate taxation. Using American data

[38] For the derivation of the equation (8), see original article by Harberger (1962), as well as for proof of the conditions which determine whether capital or labour bear the burden of corporate taxation. Harberger (1962) also includes thorough analysis of his model and also adds estimates of burden of corporate taxation which falls on capital based on American data, estimates on which I will comment later on.

and set of assumptions about elasticities in his model, Harberger estimated that burden of corporate taxation falls disproportionately on capital. As we already saw in preceding chapters where long-term macroeconomic incidence of corporate taxation was discussed, prediction of model of Laramie (1994) is that effect of corporate taxation depends on associated government budget stance and in the case that government spends all additional tax revenues, this effect is likely to be rather positive than negative. In other words, imposition of corporate profit tax under the assumption of balanced government budget Harberger makes is likely to increase profits in the Post Keynesian tax incidence theory, rather than depress it as in Harberger's model.

Second issue which arises in the conjunction to Harberger's model is whether it can yield tax incidence conclusions which correspond to the Post Keynesian tax incidence theory. In this respect, equation (8) can be simplified so as to account for the argument of Pasinetti (1966a) who holds that profitability of different techniques of production is irrelevant to their use in the production. In other words, substitution of capital and labour in production of given commodity is not a function of marginal product of either factor of production and thus substitution of factors in production has clearly no meaning. From this perspective both, S_X and S_Y, can be put equal to zero since substitution of factors of production is driven by different considerations than is their marginal productivity or cost.

In such a case, note that $S_X B = 0$ and $A/D = 1/(g_K - f_K)$ and equation (8') as well as equations (9) and (10) simplify to

$$\partial P_K = \frac{f_K}{g_K - f_K} \cdot T_{kx} \qquad (8'')$$

$$\partial P_K = \frac{f_L}{g_K - f_K} \cdot T_{lx} \qquad (9')$$

$$\partial P_K = \frac{1}{g_K - f_K} \cdot T_x \qquad (10').$$

Since nominator of equation (8'') as well as of equations (9') and (10') is necessarily positive, question of impact of different taxes depends on the sign of denominator which in turn depends on the capital intensity of non-corporate sector (un-taxed) relative to capital intensity of corporate (taxed) sector. In case that $f_K > g_K$, corporate sector is more capital intensive and burden of taxation falls disproportionately on capital. Issue of tax incidence thus becomes empirical.

As already mentioned, original Harberger (1962) article also attempts to estimate, whether corporate taxation burdens more than disproportionately capital or labour. In doing so, Harberger (1962) estimated, based on American data, capital intensity of non-corporate sector of $g_K = 0{,}5$ and capital intensity of corporate sector of

$f_K = 1/6$.[39] In the same spirit, Salí, Schneider and Zápal (2003) estimated for Czech economy capital intensity of non-corporate sector of $g_K \doteq 0{,}44$ and capital intensity of corporate sector of $f_K \doteq 0{,}3$.

As noted by Fullerton and Metcalf (2002b), higher capital intensity of non-corporate sector relative to capital intensity of corporate sector might seem surprising at first, but after consideration of number of workers employed in factories (main part of corporate sector) and after consideration of capital equipment of workers employed in agriculture (main part of non-corporate sector) is not so surprising.

Substitution of estimated values of parameters into the equations (8''), (9') and (10') yields

$$\partial P_K = 0{,}50 \cdot T_{kx} \qquad \partial P_K = 2{,}50 \cdot T_{lx} \qquad \text{and} \qquad \partial P_K = 3{,}00 \cdot T_x \qquad (11)$$

$$\partial P_K = 2{,}14 \cdot T_{kx} \qquad \partial P_K = 5{,}00 \cdot T_{lx} \qquad \text{and} \qquad \partial P_K = 7{,}14 \cdot T_x \qquad (12)$$

for American and Czech economy respectively.[40]

What all estimates in (11) and (12) say, is that burden of not only corporate income tax but, burden of any tax will fall disproportionately on labour in both countries if one accepts the Post Keynesian interpretation of Harberger (1962) model. Estimates also show, that corporate taxation is relatively friendly to labour compared to labour income taxation which is nevertheless still better than direct commodity taxation.

As we have seen, basis of corporate income taxation incidence analysis within the mainstream economics is formed by the model with rather restrictive assumptions. Despite the fact that Fullerton and Metcalf (2002b) devote substantial part of their chapter on tax incidence to its description, they too acknowledge its over-simplifying design. Maybe the most criticized nature of Harberger's model is the assumption of fixed aggregate supply of factors of production. Since taxation is likely to impact on both, savings and investments, I turn to the effects of taxation on savings in subsequent part.

Taxation and savings

As Bernheim (2002) notes in his chapter of Handbook of Public Economics concerned with the effect of taxation on savings, basis of the mainstream tax incidence theory of savings[41] is *life cycle hypothesis* formulated by Modigliani and

---

[39] For alternative specification, Harberger (1962) estimated $g_K = 0{,}5$ and $f_K = 1/11$.

[40] For alternative specification of Harberger (1962), we receive $\partial P_K = 0{,}22 \cdot T_{kx}$, $\partial P_K = 2{,}22 \cdot T_x$ and $\partial P_K = 2{,}44 \cdot T_x$.

[41] Terminologically, economic literature is not yet unified. The fact that income from deferred consumption of economic agents is being taxed is a basis of "taxation of savings", "taxation of returns to savings", "interest income taxation" or "capital gains taxation" terms.

Brumberg (1954). But basic logic of mainstream theory of impact of taxation on savings can be illustrated by simple example.

Consider a household which lives for two periods and receives income, y_t, in initial period only which it divides between consumption, c_t, and savings, s_t. Savings from the first period plus after tax interest translate into the second period consumption, $c_{t+1} = s_t \cdot (1 + i \cdot (1 - t))$, where i is exogenously given interest rate and t is tax rate on income from savings. Household derives its utility from consumption in both periods in the form $U = u(c_t) + \rho \cdot u(c_{t+1})$, where $\rho \in (0;1)$ is parameter capturing intertemporal patience and u is standard, well-behaved utility function. As usual, household maximizes its lifetime utility through altering first period consumption, or formally

$$\max_{c_t} U = u(c_t) + \rho \cdot u((y_t - c_t) \cdot (1 + i \cdot (1 - t))) \tag{13}$$

where $y_t = c_t + s_t$ has been used and which after maximization yields optimality condition

$$\frac{u'(c_t)}{\rho \cdot u'(c_{t+1})} = 1 + i \cdot (1 - t) \tag{14}.$$

As is apparent from (14), taxation has impact on after tax return to savings. When tax on income from savings increases, RHS of (14) decreases and since interest rate is exogenously given, LHS of (14) must decrease accordingly so as to restore optimality condition. LHS of (14) can decreases through two channels. First, numerator of (14) decreases which means that marginal utility from first period consumption is lower which, under the assumption of well behaving utility function, can be achieved only through higher consumption in the initial period, or in other words, through less savings left over to the second period. Second possibility how optimality can be restored is through increase of denominator in (14). With intertemporal preference parameter exogenously given, increase of denominator of (14) can be achieved only through increase of marginal utility from second period consumption which can be only achieved through lower second period consumption, which is again associated with lower savings.

Although just described model is very primitive, it captures basic logic behind mainstream treatment of taxation of returns to savings. Changes in the tax rate applicable to income from savings impact on after-tax return and thus distort intertemporal profile of consumption and lower available savings.

However, in more complicated models which incorporate special forms of utility functions, initial endowment or wealth, span through more than two periods or endogenize interest rate, simple logic of higher tax lower savings does not necessarily

holds. This implies that the question of impact of taxation of returns to savings can not be decided theoretically.

But empirical studies of impact of taxation of returns to savings on aggregate level of saving in the economy are far from offering clear-cut answers. Empirical estimates of interest rate elasticity of savings cited by Bernheim (2002)[42] range from zero to unity, with most of the estimates not being significantly different from zero. What this implies is that aggregate level of saving is not sensitive to interest rate which in turn implies its insensitivity to after-tax interest rate. In other words, level of saving is determined by different factors than is the tax rate applicable to returns to it.

There are several reasons why savings might be insensitive to interest rate. Those reasons include bequest motives which guide saving behaviour irrespective of interest rates or precautionary savings through which households defend themselves from uncertain future. Put differently, bequest motives or security from uncertain future might play determining role in utility function of typical household and thus imply minor impact of interest rate changes on the level of savings. Last reason for insensitivity of savings to interest rate might be the fact that households are liquidity constrained and simply consume their whole income and thus do not save.

Besides positive question of impact of taxation on savings, mainstream economics is also interested in the normative question whether returns to savings should be taxed at all given fixed revenue needs of government or whether given government revenue needs should be met be imposition of different forms of taxes.

For that reason, above outlined model is usually extended so as to include production side of the economy, households besides consumption derive their utility from leisure and receive their income through supplying labour and models usually span for more than two periods.

In this respect, analysis can be conducted in two ways. First way is to derive optimal rate of taxation of returns to savings in a model where different forms of taxation are also available. As showed for example by Judd (1985a), Chamley (1986), Jones, Manuelli and Rossi (1993), Chari, Christiano and Kehoe (1994) or by Judd (1999) in the context of models with infinitely-lived representative agents, optimal rate of taxation of returns to savings is equal to zero and government revenue needs should be satisfied by different forms of taxation. Although under more restrictive set of assumptions, same result holds even in the framework of overlapping generations models (OLG), as shown by Atkinson and Sandmo (1980), Auerbach (1979), Auerbach (1989) or by Diamond (1973).

---

[42] Pages 1208 through 1211.

Second way to approach the question of optimal taxation of returns to savings with given government revenue needs and availability of different forms of taxation is to analyze welfare impact of tax reform which replaces taxation of savings with different form of tax. In this respect, models with infinitely-lived representative agents of Chamley (1981) or of Judd (1987a) come to the conclusion that welfare increases after tax on returns to savings is replaced by different form of a tax. Although less generally, similar conclusion holds even in OLG models of Diamond (1970), Summers (1981) or of Auerbach, Kotlikoff and Skinner (1983).

There are several reasons why returns to savings taxation yields suboptimal results in the mainstream models. First reason is already mentioned temporal distortion of consumption profile which stems from the fact that taxation of returns to saving lowers after-tax real rate of return. As a result, not only temporal profile of consumption is distorted, but shape of utility function in most models implies lower aggregate savings. Since in mainstream economics available savings determine investment, most models conclude that imposition of tax on returns to savings lowers investment all other things equal and as a final implication, lowers growth potential of the economy. When labour market is explicitly modelled, lower growth might also result from the fact that taxation of returns to savings makes consumption in general more expensive relative to leisure and thus consumers in the model tend to prefer leisure rather than work.

Although meaningful only in OLG models, imposition of tax on capital gains (or its increase) has also redistributional consequences. Introduction of tax on savings lowers welfare of current old generations which saved part of their income earned when young in order to finance consumption when old. Since by the date of decision about the amount of savings capital gains taxation was nonexistent, currently old generations, from the perspective of the new system where returns to savings are being subject of taxation, over-saved. Those over-savings imply higher government revenues in the transition period which lasts until economy is populated only by people who were born after the introduction of returns to savings tax. Depending on the nature how government spends those extra returns, introduction of capital gains taxation redistributes financial resources from old to transitional or new generations.

Despite the fact that concrete results of effect of taxation on savings are frequently model dependent, general conclusion repeatedly emerges based on mainstream economics framework which implies that taxation of returns to savings is one of the most detrimental forms of satisfying government budgetary needs, with distortions extending as far as to labour or consumption markets or compromising growth prospects of taxed economy. Generally said, the reason why mainstream economics finds capital gains taxation most detrimental to economy is that savings are very sensitive and thus even small tax imposed on it can generate considerable

behavioural changes of economic agents, behavioural changes associated in the mainstream tax incidence theory with the notion of dead weight loss.

In this respect, mainstream tax incidence theory diverges considerably from the Post Keynesian tax incidence theory. For the mainstream theory, taxation of returns to savings compromises economic growth since it is usually driven by investments, which are constrained by amounts of savings available. Since economy is usually assumed to operate with the full utilization of resources, namely in the condition of full employment, government revenue from capital gains taxation spent cannot increase corporate profits and thus induce higher investment activity.

For the Post Keynesian tax incidence theory story differs in that investments are not constrained by available savings because savings are the variable which is determined by investment needs and if available savings in one moment of time do not suffice to cover investment needs, commercial banks supply additional financial resources through money creation, in other words, money supply is endogenous.

From Post Keynesian perspective, investments are the function of animal spirits, expectations and closely linked to current profits. If expectations are high and current profits develop in a positive manner, firms will invest in expectation of even higher profits in future. What taxation of capital gains can achieve is to redistribute financial resources from wealthy with low marginal propensity to consume out of their income to poor with high marginal propensity to consume who subsequently spend their money increasing firms' profits at the same time.

If the economy is trapped in high unemployment, government can through imposition of tax on revenues to savings which it redistributes to unemployed (who spend it) increase in a very short time corporate profits and thus lower unemployment. Early Post Keynesian tax incidence models through the assumption that workers do not save stress exactly this effect. Since workers do not save, if government increases capital gains tax rate and spends all additional revenues generated in a way that workers increase their consumption, corporate profits increase by the full amount of additional tax revenue, most likely improving expectations and thus increasing investment activity.

Models of tax incidence of capital gains taxation originating in mainstream economics are not able to generate such results despite often made assumption of balanced government budget. Reason is that those models assume full utilization of resources by given economy and thus additional tax revenues spent by government represent mere redistribution, rather than additional consumption as in the Post Keynesian tax incidence theory. Optimal taxation of savings is thus from Post Keynesian perspective not non-existent as in the mainstream theory, but rather such taxation of savings which falls on classes with high marginal propensity to save,

supported by government spending in a way that additional revenues end up in the hands of classes with low marginal propensity to save.

Taxation and investment

As noted by Hassett and Hubbard (2002) in their chapter on tax policy and business investment in Handbook of Public Economics, effect of taxation on private investment behaviour attracts considerable attention of mainstream economists since private investments are usually regarded as a key determining variable of economic growth from the long-run perspective.

Mainstream theory of incidence of taxation on investment naturally starts with mainstream theory of private investment and extends its models so as to account for impact of various types of taxes. In general, two approaches are used. First, based on neoclassical production function and second, based on Tobin's q approach. Since both approaches can be illustrated by simple examples, I consider them in turn.

First approach takes neoclassical production function as its starting point. Consider thus production function of the representative firm with the constant returns to scale in the form

$$Y = A \cdot L^{\alpha} \cdot K^{1-\alpha} \tag{15}$$

where Y is firm's output, A is positive technology parameter, L and K are amounts of labour and capital used in the production and $\alpha \in (0;1)$ captures labour share in output.

Assuming that the firm takes prices as exogenous variable, we can normalize them to unity and write firm's cost function as a

$$C = w(1+t_l)L + r(1+t_k)K \tag{16}$$

where w is pre-tax wage, r is pre-tax real interest rate, t_l and t_k are tax rates applicable to labour and capital. Since firm takes prices, wages and interest rate as exogenous variables, it varies capital and labour used in the production so as to maximize profit, $\Pi = Y - C$. In such a framework, it is easy to verify that maximization yields two optimality conditions

$$\partial Y / \partial L = w(1+t_l) \tag{17a}$$

$$\partial Y / \partial K = r(1+t_k) \tag{17b}.$$

Condition (17a) says that firm will hire new workers until their marginal product equals wage adjusted for the effect of labour taxation and equation (17b) that it will invest until the point where marginal product of capital equals real interest rate adjusted for the effect of capital taxation.

Assuming for a moment that real interest rate remains equal after the increase of capital tax, such a change will lead to the increase of LHS of (17b) and thus in order for optimality condition to be satisfied again, marginal productivity of capital must increase which can be only achieved through its reduction.[43] Relaxing the assumption of fixed real interest rate, reduction in capital lowers real interest rate and thus partly offsets hike in capital tax rate, nevertheless, with capital stock being unambiguously lower after the capital taxation increase.[44] What this implies to investment is that until new equilibrium is reached after the imposition or increase of capital taxation, investment will temporarily be lower than would have been otherwise.

Ability of capital taxation to depress corporate investment is a common feature of models based on neoclassical production function. This common feature comes from the fact that in mainstream theory, capital adjusts to the point where marginal product of capital equals tax adjusted real interest rate and since taxation tends to increase it, it reduces capital used in the production. Similar results hold even in the approach based on Tobin's q approach.

Tobin (1969) assumed that in a tax-less world, firms invests up to the point, where one dollar invested into the new capital increases its market value by more than one dollar. Tobin (1969) also holds, that good approximation of market value of additional unit of capital (marginal q) is average market value of capital stock, that is average q defined as market value of the capital stock to its replacement cost.[45]

As already said, firm will invest up to the point where additional dollar spent on investment increases its market value by more than a dollar, that is, when q exceeds unity. Under such circumstances, it is also natural to assume that investment will be increasing function of q. In such a framework, gross investment I can be written as

$$I = I\left(\frac{V}{K}\right)K \tag{18}$$

where V is firm's market value and K is firm's capital in accounting prices, in other

---

[43] Formally, since $\partial Y/\partial K = (\alpha - 1)AL^{\alpha}K^{-\alpha}$ implying marginal product of capital is decreasing function of K, optimality condition is restored with lower capital than before the tax change. Note also that since $\partial Y/\partial L = \alpha AL^{\alpha-1}K^{1-\alpha}$, marginal productivity of labour decreases with falling amount of capital which implies that imposition of capital tax in this simple model lowers also wages.

[44] More specifically, capital decreases after the capital tax introduction which lowers real interest rate. Lower capital stock can be regarded as a part of tax burden falling on demand side of the capital market (firms) and lower real interest rate can be regarded as a part of tax burden falling on supply side of the capital market (households). Proportion in which burden is shared between supply and demand of capital depends on its interest rate elasticity with less elastic side of the market bearing larger part of the burden of the tax.

[45] See Hayashi (1982) for rigorous treatment of issues of marginal and average Tobin's q.

words, capital replacement costs and the ratio of V to K is Tobin's q. Above mentioned consideration about investment incentives also imply $I(1)=0$ and $I'>0$.

Since capital income tax, t_g, impacts on firm's market value, in the presence of taxes, q must be adjusted for its effect and thus (18) becomes

$$I = I\left(\frac{V}{K}\left(1-t_g\right)\right)K \tag{18'}$$

where for future reference tax adjusted q shall be denoted as $q' = q\left(1-t_g\right)$.

Turning now to the supply side of the capital market, equity owners require real after-tax rate of return which induces them to hold company's equity, r, which equals to

$$r = \frac{D\left(1-t_p\right)}{V} + \frac{\dot{V}}{V} \tag{19}$$

where D are dividends, t_p is personal income tax rate and $\dot{V} = \partial V/\partial t$. Since dividends can be given as a difference between firm's profit and gross investment and assuming fixed labour stock is fully employed, $D = (1-t_c)F'(K)K - I(q')K$ where t_c is corporate income tax rate.

It is convenient to examine the model in terms of dynamics of K and q. Using equations (18') and (19) and associated definitions, it can be shown that

$$\dot{K} = I(q')K \tag{20}$$

and

$$\dot{q} = \frac{rq - \left(1-t_p\right)\left[\left(1-t_c\right)F'(K) - I(q')\right]}{1-t_g} - I(q')q \tag{21}$$

where stability of the whole system is given by $\dot{K}=0$ and $\dot{q}=0$. Now it is easy to show that equation (20) implies first equilibrium condition

$$q' = q\left(1-t_g\right) = 1 \qquad \text{or} \qquad q = 1\cdot\frac{1}{1-t_g} \tag{22}$$

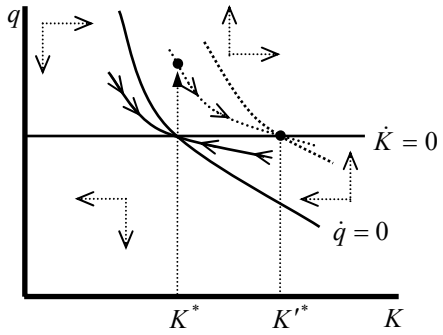
and equation (21) already using (22) implies second equilibrium condition

$$r = \left(1-t_c\right)\left(1-t_p\right)\left(1-t_g\right)F'(K) \tag{23}.$$

Condition (22) says, that firms will invest up to the point where tax-adjusted market to replacement cost ratio of capital equals unity. On the other hand, condition (23) implies that marginal product of capital, adjusted for the impact of all the types of taxes in the model equals real rate of return.

Condition (23) also implies that increase of any form of tax leads to decrease of amount of capital. How taxes differ in their impact can be analyzed graphically using graph, with K on a horizontal and q on vertical axis. Equilibrium of the model is implied by the conditions (22) and (23). Since $\dot{K} = 0$ only for one value of q, $\dot{K} = 0$ curve will be horizontal on that value and it can be shown that $\dot{q} = 0$ curve for positive values of D is decreasing function of K.

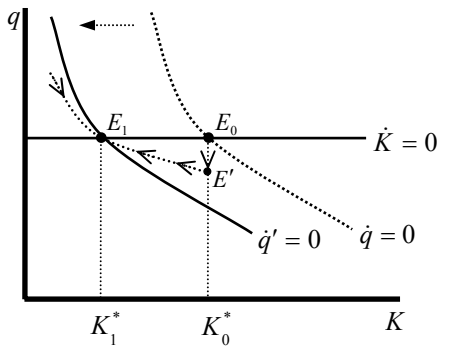
Graph 1: Basic working of Tobin's q model



Now equilibrium value of capital is marked by the intersection of $\dot{K} = 0$ and $\dot{q} = 0$ curves which corresponds to the equilibrium level of capital K^* with dynamics of the model indicated by the arrows. Since capital can change only slowly in time, model implies that when any change disturbs long-term equilibrium, q jumps on the indicated saddle path which it than follows until new equilibrium value of capital K'^* is reached.

Impact of imposition or rise of corporate or personal income tax is the same in this version of Tobin's q model. Inspection of equilibrium condition (22) reveals that $\dot{K} = 0$ curve stays intact while condition (23) implies that $\dot{q} = 0$ curve shifts to the left through already explained effect on marginal product of capital. In the short-run, q jumps from the old equilibrium E_0 to the point E' on the new saddle path represented by lower market value of capital from where it gradually follows to the new equilibrium point E_1 where original value of q reaches its original level and which is associated with lower amount of capital K_1^*.

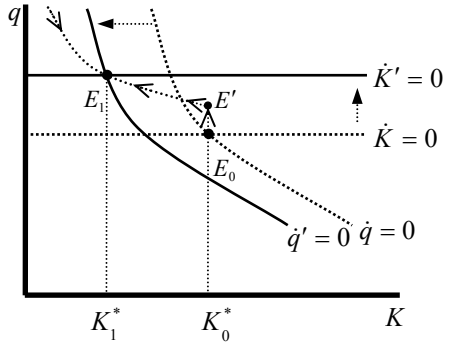
Graph 2: Impact of corporate and personal income tax in Tobin's q model



Impact of imposition of corporate or personal income tax on investment follows from the difference in amount of capital between the two equilibria. Since amount of capital decreases during the period when economy converges into the new equilibrium, investments temporarily decrease with recovery after the new equilibrium is reached.

Impact of imposition of capital income taxation differs in certain respect from already described case. Not only equilibrium condition (23) implies that $\dot{q} = 0$ curve shifts to the left but also equilibrium condition (22) implies that $\dot{K} = 0$ curve shifts up, with new equilibrium associated with higher q. Again, after the imposition or rise of capital income taxation, q jumps from old equilibrium E_0 to the point E' from where it converges into the new equilibrium position E_1 which is associated with lower amount of capital than in the old equilibrium. Since impact of any type of tax on equilibrium condition (23) implies the equal reduction of the amount of capital, additional impact of capital income taxation through equilibrium condition (22) implies that compared to corporate and personal income tax, imposition of capital income tax leads to more pronounced capital reduction. In terms of business investment, this more pronounced capital reduction translates into more pronounced slowdown of investment activity or to longer period of low investment activity associated with falling amount of capital.

Graph 3: Impact of capital income taxation in Tobin's q model



As shall be already apparent from the illustration of mainstream approach to impact of taxation on investment activity, mainstream tax incidence theory predicts that imposition of any type of tax is very likely to have negative impact on investment activity which transposes into lower economic growth in the long-run. It is thus interesting to look through empirical research of the very same issue.

As outlined by Hassett and Hubbard (2002), neoclassical models of investment based on Tobin's q have been basis of empirical research using mostly time-series data and looking for determinants of investment activity. Despite early promising results of Hall and Jorgenson (1967) who found impact of taxation on business investment, their conclusion were heavily criticized and further investigation of Eisner (1969), Eisner (1970), Eisner and Nadiri (1968), Chirinko and Eisner (1983), Bosworth (1985) or Chirinko (1993) converged to the conclusion that investment activity is correlated with lagged output, while interest rates and tax variables do not add significant explanatory power. In other words, empirical analysis of that time revealed that investment behaviour is given by past economic performance, while cost of acquisition of capital for investment and taxation does not have empirically detectable impact on it.

Hassett and Hubbard (2002) note that such results discomfited mainstream economists since it refuted whole theory of business investment based on marginal productivity of capital and production function. Moreover, mainstream investment

behaviour models needed to explain, why today's investment is correlated with yesterday's output.

In further development, number of features has been added into the mainstream investment activity models and new approaches were used in the empirical analysis. First, models were extended to capture the cost of adjustment of capital stock which provided theoretical link between lagged output and current investment absent in original neoclassical models.

Second, empirical analysis departed partially from time-series data and focused more on cross-sectional variations in investment activity in order to identify effects of taxation. In this respect, Auerbach and Hassett (1991), Cummins, Hassett, Hubbard, Hall and Caballero (1994) and Cummins, Hassett and Hubbard (1996) find some impact of taxation on investment activity.

Third, alternative empirical approach not relying on Tobin's q framework but rather on firm's Euler equation and firm-level data has been used. In this respect, some effect of taxation on investment activity is reported by Hubbard, Kashyap and Whited (1995) for American companies and by Cummins, Harris and Hassett (1995) or Cummins and Hubbard (1995) for European firms.

Fourth, models of investment activity of Abel and Eberly (1994, 1996 and 1999) which incorporate not only adjustment costs but combine their effect with uncertainty and costs of reversing already installed investments offer another theoretical starting point. Their models of uncertainty and costly reversibility imply that firms operate in three basic regimes. There are two regimes in which net business investment will be either positive or negative and sensitive to changes in Tobin's q just as in older models. Third operating regime lies between the two and is characterized by zero business investment activity and also by insensitivity of investment to changes in Tobin's q. What this implies is that for relatively large interval of Tobin's q, firms' investment activity will not be affected by changes in Tobin's q and thus insensitive to tax changes. While empirical investigation of implications of investment models with uncertainty and irreversibility are still scarce, Barnett and Sakellaris (1998) report findings that support them.

Last approach to empirical research of effect of taxation on investment activity is to account for capital heterogeneity which is still in its infancy.

Hassett and Hubbard (2002) summarize empirical finding of effects of taxation on investment such that it is hard to find any effect of taxes on aggregate investment activity, while empirical results suggest some effect on the firm-level. Such findings seem to correspond to shortcomings of both, mainstream and Post Keynesian tax incidence theory concerned with impact of taxation on investment.

Mainstream tax incidence theory predicts negative impact of any type of tax on investment activity, since it neglects the channel through which taxes might increase investment due to the fact that if government spends additional tax revenues, profits of at least some firms might rise, inducing them to invest. This might explain empirically observed negligible impact of taxation on aggregate investment activity, since after the imposition of additional tax, profits of some firms increase inducing them to invest and profits of some firms decrease with overall zero impact on aggregate investment activity.

On the other hand, Post Keynesian tax incidence theory holds that impact of at least some types of taxes on investment activity is positive due to increase of profits which is induced by higher governmental consumption. In this respect, Post Keynesian tax incidence theory neglects the fact that when government imposes an extra tax and spends revenue generated by this tax, profits of some firms will increase while other firms will experience decrease in profits. In other words, Post Keynesian tax incidence theory neglects heterogeneity of firms and capital which also explains more successful identification of effect of taxation on investment by empirical literature which is based on firm-level data.

Because savings and investment can be regarded as one of the key determinants of economic growth, conclusions mainstream and Post Keynesian tax incidence theories supply about the effect of taxation on economic growth should be clearly apparent by now.

Taxation and growth

Since Handbook of Public Economics does not offer any synthesis of already described effects of taxation on investment and savings which would bind together to form a theory of effect of taxation on growth, in this part I shall treat Heijdra and Ligthart (2002) as a representative illustration of the mainstream tax incidence theory of growth. Indeed, mainstream theory concerned with the relation of taxation and economic growth has been able to supply range of models, where negative correlation between taxes imposed by government and economic development can be illustrated.[46] Since those models differ in modelling approach and assumptions made, it is hard to establish or present a single model as a representative illustration of the mainstream approach.

---

[46] Early mainstream models used for investigation of relation of taxation and growth used exogenously given saving behaviour, which has been heavily criticized since this assumption is clearly inappropriate for the long-term perspective of growth models. Later on, mainstream economics used perfect foresight models with infinitely living representative agents, investigated for example by Turnovsky (1990), Abel and Blanchard (1983), Judd (1985b, 1987a or 1987b). For further reference, I shall refer to perfect foresight infinitely living representative agent models as to RA models.

Because taxation might impact on economic growth through number of channels, any necessarily restrictive assumption might obscure the picture. For this reason, model of Heijdra and Ligthart (2002) described in detail in Heijdra and Ligthart (2000) serves current purpose well since it makes very few assumptions. The basic model follows Diamond (1965) OLG approach but does not assume that agents live for fixed two periods, instead, length of live of economic agents is assumed to be stochastic and thus unknown to economic agents who thus must face certain degree of uncertainty in their life-time consumption and saving planning. Their model has standard OLG endogenized behaviour of savings and capital but differently from most of the OLG models, Heijdra and Ligthart (2002) endogenize labour-leisure decisions of households which adds a realistic feature into their model. In other respects, their model can be regarded as a standard OLG model including the balanced budget assumption.

Heijdra and Ligthart (2002) investigate the effect of imposition of capital tax, labour income tax and consumption tax on output, y, economy's capital, k, employed labour, l, consumption, c, real wages, w and on real interest rate, r. Besides basis analysis, work of Heijdra and Ligthart (2002) notes on the difference between impact of taxation in OLG and RA models and also investigates welfare effect of changes in taxation on the different generations of economic agents in their model. Those three generations are those old by the date of tax change, those young by the date of tax change and the generation of people yet to be born in the future.

Following table shows changes in economic variables in OLG and RA models and changes of welfare of different generations after the imposition of different types of taxation.

Table 11: Impact of taxation in OLG and RA models

OLG models						
	y	k	l	c	w	r
Capital tax	-	-	0	-	-	-
Labour tax	-	-	-	-	0	0
Consumption tax	-	-	-	-	+	-
RA models						
	y	k	l	c	w	r
Capital tax	-	-	0	-	-	0
Labour tax	-	-	-	-	0	0
Consumption tax	-	-	-	-	0	0
Change in welfare						
	Old generation		Young generation		Future generations	
Capital tax	-		+		-	
Labour tax	+		-		-	
Consumption tax	-		+		+	

Note: Summary of conclusion of Heijdra and Ligthart (2002) regarding their OLG model. RA models are models with perfect foresight infinitely lived economic agents. Changes apply to post-tax long-run equilibrium compared to pre-tax long-term equilibrium.

Number of results which corresponds to already mentioned mainstream tax incidence theory conclusions are worth noticing. First, any type of tax has negative impact on growth, capital and consumption and with the exception of capital tax also on labour in both types of models. Second, it is interesting to note that capital taxation depresses wages, which stay intact under labour taxation in both types of models and increase with imposition of consumption taxation in OLG model. Third, often quoted equality of labour income and consumption taxation from long-term perspective which holds in RA models does not hold in more sophisticated OLG models. Fourth, imposition of different types of taxes has different distributional consequences. While capital and consumption taxes lower welfare of old generations due to the fact that those generations obtain their income from savings and use it for consumption, labour income taxes improve welfare of existing old generation since it already does not work but benefits from increased government consumption which is due to extra government revenues and balanced budget assumption.

Although any type of tax lowers economic growth according to the mainstream tax incidence theory, certain types of taxes are regarded so as to be more detrimental. As we have seen in preceding part, capital income taxation lowers investment activity and thus amount of capital to a higher degree than corporate or labour income taxation. Since investment activity and capital accumulation are regarded by mainstream theory as one of the most important determinants of economic growth, general wisdom seems to be held by mainstream economists that capital income taxation is the worst method of raising governmental revenue.

This general wisdom is reflected by Fuchs, Krueger and Poterba (1998) who report that mainstream economists in survey where they were asked to estimate percentage point change in the average GDP growth rate over ten years following replacement of capital income taxes with revenue-neutral wage tax on average estimate that annual GDP growth rate would increase by 1,1 percentage points.

Mainstream and Post Keynesian incidence theories thus differ in certain aspects and channels through which taxation influences economic growth. Mainstream tax incidence theory is predominantly concerned with the effect of taxation on savings, since the amount of available savings limits investments and thus indirectly output growth. Instead, Post Keynesian tax incidence theory focuses mainly on effect of taxation on profits, which are regarded as key variable determining investment activity and thus economic growth.

Turning now to empirical findings about impact of taxation on economic growth, at least two preliminaries has already been mentioned in preceding parts. First, recall the struggle of mainstream economists to find empirically meaningful effect of taxation on savings and investment and second, recall the Post Keynesian literature-

based findings about considerable effects of wage taxation and negligible impact of corporate profit taxation on investment activity. First hint implies that taxation in general need not be correlated with economic growth while second hint suggests that structure of taxation and taxes used to raise government budget revenue might be of primary importance.

Going to full-fledged literature investigating the issue of impact of taxation on economic growth, several stages of development can be detected. Early empirics of taxation and growth which can be found among others in Barro (1991), Engen and Skinner (1992) and Barro (1994) report negative correlation between share of taxes to GDP and output growth in wide sample of countries. Although early empirical results seemed promising, further analysis yielded much less persuasive results and thus Engen and Skinner (1996) conclude that evidence that taxation is negatively correlated with economic growth is mixed, Agell, Lindh and Ohlsson (1997) conclude that evidence on the same issues is mixed at best and Mendoza, Milesi-Ferretti and Asea (1997) hold that impact of taxation on economic growth is negligible.

In light of those results, Temple (1999) concludes his review stating that issue whether taxation compromises economic growth or not is yet to be settled and that the relation might be more complicated. Similar proposition is to be found in Kneller, Bleaney and Gemmell (1999) who state that not a level of taxation, but its structure might matter for economic growth. In this respect, Widmalm (2001) analyzes relation between different types of taxes and economic growth using pooled cross-sectional data from 23 OECD countries between 1965 and 1990 and after controlling for other growth determinants reports that only type of taxation which has significant and negative effect on economic growth is personal income taxation.

To summarize the section where I tried to contrast mainstream and Post Keynesian tax incidence theory, we have seen that the mainstream tax incidence theory relying on marginal productivity principle and other standard assumptions predicts negative impact of any type of tax on key economic variables, output, capital, investment, savings or consumption. Struggle to find support for theoretical conclusions in empirical literature seems to be due to the fact that the mainstream tax incidence theory neglects certain channels, which are to the contrary stressed by the Post Keynesian tax incidence theory.

Probably most important channel stressed by Post Keynesians and neglected by mainstream economists is aggregate demand effect linked with taxation which further implies that not only economic aspects of taxation should be investigated. Since incidence of taxation differs according to whether government keeps its budget in balance or not, political economy considerations should be also brought to complement

the tax incidence story. However, on such issues economic theory is yet completely silent.

Mainstream and Post Keynesian tax incidence theories also differ in forms of taxation preferred. Mainstream economists hold commonly shared wisdom that personal income taxation is the least economically detrimental technique of raising government budget revenues. Since personal income taxation equals in incidence with consumption taxation in wide range of mainstream models, it too offers a convenient method of satisfying government revenue needs.

On the other hand, Post Keynesians prefer capital income or corporate income taxation due to its effect on aggregate effective demand when government balances its budget, in other words, when government spends all additional revenue generated. Once this extra revenue is spent, aggregate effective demand increases pushing up firms' profits and thus expectations which in turn imply higher investment activity and faster economic growth.

9. Recent Trends in Taxation in the Czech Republic

This part aims to outline recent trends in the area of taxation in the Czech Republic and interpret them from the standpoint of both, mainstream and Post Keynesian, tax incidence theory. A natural way to proceed would be to describe development of different types of taxes over the past years capturing the changes in marginal rates applicable and going through other relevant details of the tax system such as for example tax brackets applicable to personal income tax. Unfortunately, tax system in the Czech Republic has gone through rather turbulent development during recent years and it is hard, if not impossible, to identify which changes brought increase and which changes brought reduction of the tax burden.

Take reduction of marginal rates applicable to personal income and simultaneous broadening of definition of taxable income as an example. Reduction of marginal rate represents reduction in the tax burden while broadening of taxable income represents increase in the tax burden with overall change being very uncertain, most probably positive for certain groups of population and negative for others.

For this reason, I compute effective tax rates (ETRs) on labour income, corporate income, consumption and capital income using methodology pioneered by Mendoza, Razin and Tesar (1994). The motivation for using ETRs is the acknowledgement that complexity of tax systems, credits, allowances, deductions, different definitions of taxable income, different types of taxes and treatment of exceptions renders direct international comparability of tax burden in separate countries nearly impossible. Similar complication also applies to changes in tax system which alters more than one of its aspects at a time.

Mendoza, Razin and Tesar (1994) thus propose a methodology for computation of ETRs based on national accounts and government revenue statistics. From government revenue statistics, data about revenue from following types of taxes are needed: taxes on income, profits, and capital gains of individuals, t_{Ind}; taxes on income, profits, and capital gains of corporations, t_{Corp}; total social security contributions, t_{SocSe}; employer's social security contributions, $t_{SocSeEmp}$; taxes on payroll and workforce, t_{Pay}; recurrent taxes in immovable property, t_{ImPr}; taxes on financial and capital transactions, t_{FinTr}; general taxes on good and services, t_{VAT}; and excise taxes, t_{Ex}.

From national accounts, data about following variables are needed: private final consumption expenditure, C; government final consumption expenditure, G; compensation of employees paid by producers of government services, $GovW$; operating surplus of private unincorporated enterprises, OS_I; operating surplus of

corporations, OS_C; households' property and entrepreneurial income, $PerInc$; wages and salaries, W; and total operating surplus of economy, OS_E.[47]

Once one obtains relevant data, four different types of ETRs can be calculated. First is effective tax rate on consumption defined as

$$ETR_{Cons} = \left[\frac{t_{VAT} + t_{Ex}}{C + G - GovW - t_{VAT} - t_{Ex}} \right] \times 100 \qquad (24).$$

Second is effective tax rate on labour income defined as

$$ETR_{Labour} = \left[\frac{t_h \cdot W + t_{SocSe} + t_{Pay}}{W + t_{SocSeEmp}} \right] \times 100 \qquad (25)$$

where $t_h = \left[\frac{t_{Ind}}{OS_I + PerInc + W} \right] \times 100$ is used. Third is effective rate on corporate income defined as

$$ETR_{Corp} = \left[\frac{t_{Corp}}{OS_C} \right] \times 100 \qquad (26)$$

and fourth is effective tax rate on capital income defined as

$$ETR_{Capital} = \left[\frac{t_h \cdot (OS_I + PerInc) + t_{Corp} + t_{ImPr} + t_{FinTr}}{OS_E} \right] \times 100 \qquad (27).$$

Since comparison of ETRs from international perspective can be interesting, I calculated ETRs for selected OECD countries which can be used as a kind of benchmark against which development in the Czech Republic can be assessed and which are given in table no.12.

[47] Since national accounts as collected by OECD have predefined structure which does not change over time, titles of variables mentioned are taken directly from national accounts structure which greatly limits mis-specification due to statistical omissions and use of different variables with similar names. Similar advantage applies to government revenue statistics collected also by OECD. Each type of tax revenue has four-digit code which reduces possibility of statistical error. Moreover, government revenue statistics collected by OECD corresponds with national accounts data collected by the same institution which guarantees methodological comparability of both data sources. See Mendoza, Razin and Tesar (1994) for details.

Table 12: Effective tax rates in selected OECD countries

	Austria	Germany	UK	France	Hungary	Poland	Sweden	US
			Effective tax rate on	LABOUR INCOME				
1990	:	:	23,4	46,1	:	:	:	24,6
1995	46,6	40,8	24,2	46,4	44,1	42,2	50,5	25,3
2000	48,4	40,0	26,1	45,5	30,9	33,3	57,8	27,0
			Effective tax rate on	CORPORATE INCOME				
1990	:	:	18,8	11,8	:	:	:	12,9
1995	7,0	5,3	13,8	11,4	10,0	20,1	11,8	15,1
2000	8,2	8,7	16,2	19,2	10,1	15,2	20,5	14,3
			Effective tax rate on	CONSUMPTION				
1990	21,0	:	15,6	19,7	:	:	:	4,9
1995	18,5	16,1	16,4	19,0	23,6	25,9	27,8	5,4
2000	20,0	16,3	16,1	19,6	29,5	21,5	26,2	5,1
			Effective tax rate on	CAPITAL INCOME				
1990	:	:	36,5	17,0	:	:	:	26,0
1995	15,3	16,5	30,2	18,8	15,4	24,7	25,2	26,7
2000	17,5	18,4	37,0	25,4	28,6	20,3	33,5	28,0

Note: Effective tax rates according to Mendoza, Razin and Tesar (1994) methodology. Based on OECD (2003a) and OECD (2003b) data.
Source: Author's calculations

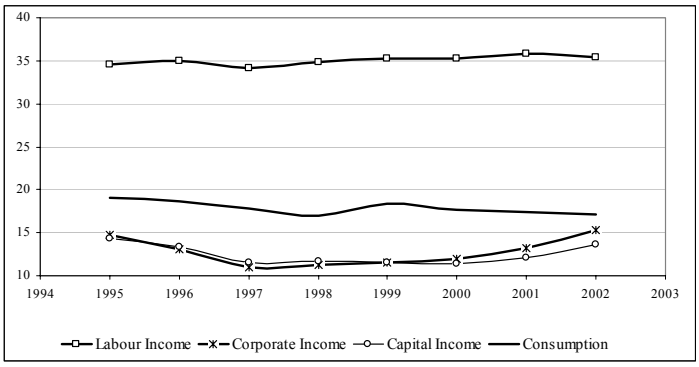
Although changes of ETRs over time do not show clear and unified pattern, comparison of level of ETRs shows certain similarities. In six out of eight countries (all except UK and US) ETR on labour income is the highest one and ETR on corporate income in those countries is the lowest one, with ETRs on consumption and capital income somewhere in between. In UK and US, where highest ETR is not ETR on labour income, ETR on capital income is the highest one and ETR on consumption is the lowest one, with ETRs on labour and corporate income somewhere in between.[48, 49]

[48] Mendoza, Razin and Tesar (1994) investigate correlation among their ETRs and different economic variables of concern. They show that for their sample of countries (US, UK, France, Germany, Italy, Japan and Canada) and for period 1965 through 1988, ETR on capital income is weakly and negatively correlated with savings to GDP ratio and investment to GDP ratio and ETR on labour income is strongly and negatively correlated with hours worked in manufacturing.

[49] Without going into much detail, it is interesting to note on growth differences between the two groups of countries. Based on EUROSTAT data, percentage real annual growth rate of GDP in period 1991 through 2000 in countries which belong to the group of countries with highest ETR on labour income averaged at 2,2. On the other hand, percentage real annual growth of GDP in the countries where the highest ETR is that on capital income for the same period averaged at 2,9. Although presented findings must be treated only as indicative, they lend support rather to the Post Keynesian tax incidence theory than to the mainstream tax incidence theory which would have problem to explain better growth performance in countries with high ETR on capital income.

Having established certain benchmark against which ETRs in Czech Republic can be assessed, following graph shows the development of different ETRs in the Czech Republic over period 1995 through 2002. As is apparent from development and level of ETRs in the Czech Republic, it would belong to the group of countries with highest ETR on labour income. Differently from the rest of the countries in that group where lowest ETR is that on corporate income, lowest ETR in Czech Republic is that on capital income judging by year 2002. Although development of ETRs on labour income and consumption does not show any notable changes, ETRs on capital and corporate income after the decline in second half of the 1990's show a rising trend during last several years.

Graph 4: Effective tax rates in the Czech Republic, 1995-2002



Note: Effective tax rates according to Mendoza, Razin and Tesar (1994) methodology. Based on revised national accounts of Czech Republic.
Source: Author's calculations

From the standpoint of the mainstream tax incidence theory, structure of taxation in the Czech Republic and in countries belonging to the group with highest ETR that on labour income can be perceived relatively optimal. As outlined in preceding chapter, mainstream tax incidence theory conclusions call for relatively light taxation of capital and corporate income which is in fact a reality in the Czech Republic. On the other hand, labour income taxation is perceived by mainstream economists as an easy source of government budget revenue which should be used rather than corporate or capital income taxes.

From the standpoint of the Post Keynesian tax incidence theory, structure of taxation in the Czech Republic and in countries belonging to the similar group is far from being optimal. Post Keynesian tax incidence theory which stresses effect of taxation on aggregate effective demand calls for light taxation of labour income, contrary to what reality of Czech tax system currently seems to be.

On the other hand, Post Keynesian tax incidence theory opts for corporate and capital income taxation when government budget revenue needs should to be met. From this perspective, structure of tax system in UK and US, where highest ETR is that on capital income is in accord with the Post Keynesian tax incidence economic policy conclusions.

Although methodology for computing ETRs overcomes complications connected to the complexity of tax systems, reliance on national account data which are published with certain delay precludes illustration of very recent trends in different tax

burdens. Consider then recent changes in Czech tax system which can be divided into three broad groups.

First group of changes includes changes in corporate income taxation which compose of lowering of marginal tax rate from original 31 % gradually to 24 % by the year 2006, faster depreciation times or preferential treatment of corporate expenses on research and development. This set of changes is very likely to bring about decrease in ETR on corporate income over the near future and despite critical budgetary situation of the Czech Republic has been implemented, being defended with support-of-economic-growth arguments.

Second group of changes which took place predominantly in year 2004 includes changes in consumption taxes which compose of move of wide range of goods from group with reduced value added tax (VAT) rate to the group with basic VAT rate, reduction of basic VAT rate from 22 % to 19 % or increase of rates of number of excise taxes. This set of changes can be expected to increase slightly ETR on consumption despite opposing effect of some of the measures since Czech government used changes in indirect taxation as a way how to replace reduced revenue from corporate income taxation.

Third group of changes deals with changes in personal income taxation and consists of replacement of child tax allowance with tax credit, introduction of common taxation of married couples or of change in taxation of self-employed persons. Because opposing effects of just mentioned measures, ETR on labour income will most probably not be affected by them.

Again, judging about recent changes in Czech tax system from the standpoint of mainstream tax incidence theory, decrease of tax burden on corporations and compensation of lost budget revenues with increase of consumption taxation has ability to boost economic growth, decrease distortionary effects of taxation or improve welfare. On the other hand, Post Keynesian tax incidence theory would hold that ability of lower corporate taxation to fuel economic growth is rather limited and will be offset by the impact of increase of consumption taxes on aggregate effective demand with overall effect being neutral at best.

10. Conclusion

We have seen that the Post Keynesian tax incidence theory is firmly built into the rest of the Post Keynesian economic theory. It takes its basic premises and builds on them a coherent theory, which goes along the rest of Post Keynesian conclusions.

It is not only consonant with the rest of the Post Keynesian economics, it is also coherent internally. Although two basic traditions are to be found within the Post Keynesian tax incidence tradition, they confirm the basic conclusions of each other. Through the mark-up pricing and focus on impact of taxes on effective demand, the Post Keynesian tax incidence theory also integrates its microeconomic and macroeconomic parts.

As regards the basic conclusions of the Post Keynesian tax incidence theory, what emerges is exceptional vulnerability of wages, wage earners, workers or wage share in national income – however it is called. As an addendum to this, exceptional resistance of profits, profit earners or receivers, capitalists or profits share in national income to taxation emerges.

From this perspective, natural policy conclusion of the Post Keynesian tax incidence theory follows, which calls for reliance on profit taxation and on taxes that have the ability to stimulate aggregate effective demand in general.

This rather general conclusion sheds a new light on the mainstream claim that there is a trade-off present in imposition of capital taxes that ensure more effective redistribution but depress national income on the other hand. Post Keynesians would claim capital or profit taxation to be the first best solution since this form of taxation ensures not only redistribution but also has positive impact on national income, profitability of investment and wage share in national income.

On the microeconomic level, Post Keynesians would replace mainstream higher-elasticity-lower-tax principle with higher-elasticity-higher-tax principle and would call for commodity taxation, which exempts basic needs from taxation.

However, I am rather sceptical about the real world tax systems to become built along just described lines since the mainstream tax theory seems to hold firmly on the grounds it has already conquered.[50]

We have also seen that differences in conclusions of Post Keynesian and mainstream tax incidence theories originate in their methodological approach and in different view of how economic forces interact and how economic system works. It has also became apparent that the mainstream tax incidence theory is not enthusiastic about

[50] I agree on this point with Kalecki (1937b) who expressed his doubts about more intensive use of capital taxation, which emerged as optimal form of taxation even from his, judged from today's perspective, rather basic model.

any form of taxation and sees most of the taxes to be detrimental to economic growth, quite contrary to the Post Keynesians who at least in some taxes see avenue for improvement in economic conditions.

Which of the two tax incidence theories is the "true one" is certainly an interesting question but answer seems to be *it depends*. Certainly, the mainstream tax incidence theory is less likely to hold in the conditions of idle resources, when the channel which operates through aggregate effective demand and which the Post Keynesian tax incidence theory stresses is likely to be important. On the other hand, in the conditions of full capacity utilization and conditions of full use of factors of production, the Post Keynesian tax incidence theory is less likely to hold since the aggregate effective demand channel will not be so strong and also because in such a situation, substitution principles stressed by mainstream economists are more likely to apply.

Whether mainstream or Post Keynesian tax incidence theory holds might be also important from the perspective of the Czech Republic where tax system structure is designed more by mainstream economic theory guidelines. While mainstream economists would agree that recent reduction of corporate taxation can support economic growth, Post Keynesians would state that reduction of corporate taxation will have marginal effect on economic growth which is likely to be offset by the detrimental effect of increased consumption taxation.

11. References

- Abel, A.B. and Blanchard, O.J., (1983) "*An Intertemporal Model of Saving and Investment*", Econometrica, vol.51, no.3, 1983, 675-692.
- Abel, A.B. and Eberly, J.C., (1994) "*A Unified Model of Investment under Uncertainty*", American Economic Review, vol.84, no.5, 1994, 1369-1384.
- Abel, A.B. and Eberly, J.C., (1996) "*Optimal Investment with Costly Reversibility*", Review of Economic Studies, vol.63, no.4, 1996, 581-593.
- Abel, A.B. and Eberly, J.C., (1999) "*The Effect of Irreversibility and Uncertainty on Capital Accumulation*", Journal of Monetary Economics, vol.44, no.3, 1999, 339-377.
- Agell, J., Lindh, T. and Ohlsson, H., (1997) "*Growth and the Public Sector: A Critical Review Essay*", European Journal of Political Economy, vol.13, no.1, 1997, 33-52.
- Arestis, P., McCauley, K. and Sawyer, M., (2001) "*An Alternative Stability Pact for the European Union*", Cambridge Journal of Economics, vol.25, no.1, 2001, 113-130.
- Asimakopulos, A., (1971) "*The Determination of Investment in Keynes' Model*", The Canadian Journal of Economics, vol.4, no.3, 1971, 382-388.
- Asimakopulos, A. and Burbidge, J.B., (1974) "*The Short-Period Incidence of Taxation*", The Economic Journal, vol.84, no.334, 1974, 267-288.
- Atkinson, A.B. and Sandmo, A., (1980) "*Welfare Implications of the Taxation of Savings*", The Economic Journal, vol.90, no.359, 1980, 529-549.
- Auerbach, A.J., (1979) "*The Optimal Taxation of Heterogenous Capital*", Quarterly Journal of Economics, vol.93, no.4, 1979, 589-612.
- Auerbach, A.J., (1989) "*The Deadweight Loss from 'Non-Neutral' Capital Income Taxation*", Journal of Public Economics, vol.40, no.1, 1989, 1-36.
- Auerbach, A.J. and Feldstein, M., (2002a) "*Handbook of Public Economics, vol.III*", Elsevier, Amsterdam, 2002.
- Auerbach, A.J. and Feldstein, M., (2002b) "*Handbook of Public Economics, vol.IV*", Elsevier, Amsterdam, 2002.
- Auerbach, A.J. and Hassett, K.A., (1991) "*Recent U.S. Investment Behaviour and the Tax Reform Act of 1986: A Disaggregate View*", Carnegie-Rochester Conference Series on Public Policy, vol.35, 1991, 185-215.
- Auerbach, A.J., Kotlikoff, L.J. and Skinner, J., (1983) "*The Efficiency Gains from Dynamic Tax Reform*", International Economic Review, vol.24, no.1, 1983, 81-100.
- Ballard, B., (1995) "*How Keynes Became a Post Keynesian*", Journal of Post Keynesian Economics, vol.17, no.3, 1995, 325-335.
- Barnett, S.A. and Sakellaris, P., (1998) "*Nonlinear Response of Firm Investment to Q: Testing a Model of Convex and Non-convex Adjustment Costs*", Journal of Monetary Economics, vol.42, no.2, 1998, 261-288.
- Barro, R.J., (1991) "*Economic Growth in a Cross-section of Countries*", The Quarterly Journal of Economics, vol.106, no.2, 1991, 407-443.
- Barro, R.J., (1994) "*Democracy and Growth*", NBER working paper, no.4909, 1994.
- Bayoumi, T. and Masson, P.R., (1995) "*Fiscal Flows in the United States and Canada: Lessons for Monetary Union in Europe*", European Economic Review, vol.39, no.2, 1995, 253-274.
- Bernheim, B.D., (2002) "*Taxation and Saving*", in: Auerbach, A.J. and Feldstein, M., (eds.), "*Handbook of Public Economics, vol.III*", Elsevier, Amsterdam, 2002, 1173-1249.
- Bosworth, B.P., (1985) "*Taxes and Investment Recovery*", Brooking Papers on Economic Activity, vol.1985, no.1, 1985, 1-38.
- Bovenberg, A.L. and Goulder, L.H., (2002) "*Environmental Taxation and Regulation*", in: Auerbach, A.J. and Feldstein, M., (eds.), "*Handbook of Public Economics, vol.III*", Elsevier, Amsterdam, 2002, 1471-1545.
- Brennan, G. and Buchanan, J.M., (1980) "*The Power to Tax: Analytical Foundations of a Fiscal Constitution*", Cambridge University Press, New York, 1980.

- Brown-Collier, E.K. and Collier, B.E., (1995) "*What Keynes Really Said about Deficit Spending*", Journal of Post Keynesian Economics, vol.17, no.3, 1995, 341-355.
- Buchanan, J.M. and Wagner, R.E., (1977) "*Democracy in Deficit: The Political Legacy of Lord Keynes*", Academic Press, New York, 1977.
- Chamley, Ch., (1981) "*The Welfare Cost of Capital Income Taxation in a Growing Economy*", The Journal of Political Economy, vol.89, no.3, 1981, 468-496.
- Chamley, Ch., (1986) "*Optimal Taxation of Capital Income in General Equilibrium with Infinite Lives*", Econometrica, vol.54, no.3, 1986, 607-622.
- Chari, V.V., Christiano, L.J. and Kehoe, P.J., (1994) "*Optimal Fiscal Policy in a Business Cycle Model*", The Journal of Political Economy, vol.102, no.4, 1994, 617-652.
- Chirinko, R.S., (1993) "*Business Fixed Investment Spending: Modelling Strategies, Empirical Results, and Policy Implications*", Journal of Economic Literature, vol.31, no.4, 1993, 1875-1911.
- Chirinko, R.S. and Eisner, R., (1983) "*Tax Policy and Investment in Major U.S. Macroeconomic Econometric Models*", Journal of Public Economics, vol.20, no.2, 1983, 139-166.
- Cummins, J.G., Harris, T.S. and Hassett, K.A., (1995) "*Accounting Standards, Information Flow, and Firm Investment Behaviour*", in: Feldstein, M., Hines, J.R. and Hubbard, R.G., (eds.), "*The Effect of Taxation on Multinational Corporations*", University of Chicago Press, Chicago, 1995, 181-221.
- Cummins, J.G., Hassett, K.A. and Hubbard, R.G., (1996) "*Tax Reforms and Investment: A Cross-country Comparison*", Journal of Public Economics, vol.62, no.1/2, 1996, 237-273.
- Cummins, J.G., Hassett, K.A., Hubbard, R.G., Hall, R.E. and Caballero, R.J. (1994) "*A Reconsideration of Investment Behaviour Using Tax Reforms as a Natural Experiments*", Brooking Papers on Economic Activity, vol.1994, no.2, 1994, 1-74.
- Cummins, J.G. and Hubbard, R.G., (1995) "*The Tax Sensitivity of Foreign Direct Investment: Evidence from Firm-level Panel Data*", in: Feldstein, M., Hines, J.R. and Hubbard, R.G., (eds.), "*The Effect of Taxation on Multinational Corporations*", University of Chicago Press, Chicago, 1995, 123-147.
- Dalziel, P.C., (1991a) "*Does Government Activity Invalidate the Cambridge Theorem of Rate of Profit? A Reconciliation*", Journal of Post Keynesian Economics, vol.14, no.2, 1991, 225-231.
- Dalziel, P.C., (1991b), "*A Generalization and Simplification of the Cambridge Theorem with Budget Deficits*", Cambridge Journal of Economics, vol.15, no.3, 1991, 287-300.
- Damania, D. and Mair, D., (1992a) "*A Post-Keynesian Approach to the Incidence of Taxation*", in: Arestis, P. and Chick, V., (eds.), "*Recent Developments in Post-Keynesian Economics*", Edward Elgar, Aldershot, 1992.
- Damania, D. and Mair, D., (1992b) "*The Short-Period Incidence of Taxation Revisited*", Cambridge Journal of Economics, vol.16, no.2, 1992, 195-206.
- Davidson, P., (1988) "*A Technical Definition of Uncertainty and the Long-Run Non-Neutrality of Money*", Cambridge Journal of Economics, vol.12, no.3, 1988, 329-337.
- Davidson, P. and Weintraub, S., (1978) "*A Statement of Purpose*", Journal of Post Keynesian Economics, vol.1, no.1, 1978, 3-7.
- Diamond, P.A., (1965) "*National Debt in a Neoclassical Growth Model*", American Economic Review, vol.55, no.5, 1965, 1126-1150.
- Diamond, P.A., (1970) "*Incidence of Interest Income Tax*", Journal of Economic Theory, vol.2, no.3, 211-224.
- Diamond, P.A., (1973) "*Taxation and Public Production in a Growth Setting*", in: Mirrlees, J.A. and Stern, N.H., (eds.), "*Models of Economic Growth*", Macmillan, London, 1973, 215-234.
- Dow, S.C. and Rodriguez-Fuentes, C., (1998) "*The Political Economy of Monetary Policy*", in: Arestis, P. and Sawyer, M.C., (eds.), "*The Political Economy of Central Banking*", Edward Elgar, Cheltenham, 1998, 1-19.
- Eichner, A.S. and Kregel, J.A., (1975) "*An Essay on Post-Keynesian Theory: A New Paradigm in Economics*", Journal of Economic Literature, vol.13, no.4, 1975, 1293-1314.
- Eisner, R., (1969) "*Tax Policy and Investment Behaviour: A Comment*", American Economic Review, vol.59, no.3, 1969, 379-388.

- Eisner, R., (1970) "*Tax Policy and Investment Behaviour: Further Comment*", American Economic Review, vol.60, no.4, 1970, 746-752.
- Eisner, R. and Nadiri, M.I., (1968) "*Investment Behaviour and Neoclassical Theory*", Review of Economics and Statistics, vol.50, no.3, 1968, 369-382.
- Engen, E.M. and Skinner, J., (1992) "*Fiscal Policy and Economic Growth*", NBER working paper, no.4223, 1992.
- Engen, E.M. and Skinner, J., (1996) "*Taxation and Economic Growth*", NBER working paper, no.5826, 1996.
- European Commission, (2004) "*Structures of the Taxation Systems in the European Union, 2004 edition*", European Commission, Brussels, 2004.
- Fatás, A., (1998) "*Does EMU Need a Fiscal Federation?*", Economic Policy, no.26, 1998, 163-203.
- Friedman, M., (1953) "*Essays in Positive Economics*", University of Chicago Press, Chicago, 1953.
- Fuchs, V.R., Krueger, A.B. and Poterba, J.M., (1998) "*Economists' Views about Parameters, Values, and Policies: Survey Results in Labour and Public Economics*", Journal of Economic Literature, vol.36, no.3, 1998, 1387-1425.
- Fullerton, D. and Metcalf, G.E., (2002a) "*Tax Incidence*", NBER working paper, no.8829, 2002.
- Fullerton, D. and Metcalf, G.E., (2002b) "*Tax Incidence*", in: Auerbach, A.J. and Feldstein, M., (eds.), "*Handbook of Public Economics, vol.IV*", Elsevier, Amsterdam, 2002, 1787-1872.
- Hall, R.E. and Jorgenson, D.W., (1967) "*Tax Policy and Investment Behaviour*", American Economic Review, vol.57, no.3, 1967, 391-414.
- Harberger, A.C., (1962) "*The Incidence of the Corporation Income Tax*", The Journal of Political Economy, vol.70, no.3, 1962, 215-240.
- Hassett, K.A. and Hubbard, R.G., (2002) "*Tax Policy and Business Investment*", in: Auerbach, A.J. and Feldstein, M., (eds.), "*Handbook of Public Economics, vol.III*", Elsevier, Amsterdam, 2002, 1293-1343.
- Hayashi, F., (1982) "*Tobin's Marginal q and Average q: A Neoclassical Interpretation*", Econometrica, vol.50, no.1, 1982, 213-224.
- Heijdra, B.J. and Ligthart, J.E., (2000) "*The Dynamic Macroeconomic Effects of Tax Policy in an Overlapping Generations Model*", Oxford Economic Papers, vol.52, no.4, 2000, 677-701.
- Heijdra, B.J. and Ligthart, J.E., (2002) "*Tax Policy, the Macroeconomy and Intergenerational Distribution*", IMF staff papers, vol.49, no.1, 2002, 106-127.
- Hewitson, G., (1995) "*Post Keynesian Monetary Theory: Some Issues*", Journal of Economic Surveys, vol.9, no.3, 1995, 285-310.
- Hubbard, R.G., Kashyap, A.K. and Whited, T.M., (1995) "*Internal Finance and Firm Investment*", Journal of Money, Credit, and Banking, vol.27, no.3, 1995, 683-701.
- Jones, L.E., Manuelli, R.E. and Rossi, P.E., (1993) "*Optimal Taxation in Model of Endogenous Growth*", The Journal of Political Economy, vol.101, no.3, 1993, 485-517.
- Judd, K.L., (1985a) "*Redistributive Taxation in a Simple Perfect Foresight Model*", Journal of Public Economic, vol.28, no.1, 1985, 59-83.
- Judd, K.L., (1985b) "*Short-Run Analysis of Fiscal Policy in a Simple Perfect Foresight Model*", Journal of Political Economy, vol.93, no.2, 1985, 298-319.
- Judd, K.L., (1987a) "*The Welfare Cost of Factor Taxation in a Perfect Foresight Model*", The Journal of Political Economy, vol.95, no.4, 1987, 675-709.
- Judd, K.L., (1987b) "*Debt and Distortionary Taxation in a Simple Perfect Foresight Model*", Journal of Monetary Economics, vol.20, no.1, 1987, 51-72.
- Judd, K.L., (1999) "*Optimal Taxation and Spending in General Competitive Growth Models*", Journal of Public Economics, vol.71, no.1, 1999, 1-25.
- Kaldor, N., (1955) "*Alternative Theories of Distribution*", The Review of Economic Studies, vol.23, no.2, 1955, 83-100.

- Kaldor, N., (1957) "*A Model of Economic Growth*", The Economic Journal, vol.67, no.268, 1957, 591-624.
- Kaldor, N., (1966) "*Marginal Productivity and the Macro-Economic Theories of Distribution: Comment on Samuelson and Modigliani*", The Review of Economic Studies, vol.33, no.4, 1966, 309-319.
- Kalecki, M., (1935) "*A Macrodynamic Theory of Business Cycle*", Econometrica, vol.3, no.3, 1935, 327-344.
- Kalecki, M., (1937a) "*A Theory of the Business Cycle*", The Review of Economic Studies, vol.4, no.2, 1937, 77-97.
- Kalecki, M., (1937b) "*A Theory of Commodity, Income, and Capital Taxation*", The Economic Journal, vol.47, no.187, 1937, 444-450.
- Kalecki, M., (1941) "*A Theory of Long-Run Distribution of the Product of Industry*", Oxford Economic Papers, no.5, 1941, 31-41.
- Kalecki, M., (1942) "*A Theory of Profits*", The Economic Journal, vol.52, no.206/207, 1942, 258-267.
- Kalecki, M., (1968) "*Trend and Business Cycle Reconsidered*", The Economic Journal, vol.78, no.310, 1968, 263-276.
- Kalecki, M., (1971) "*Class Struggle and the Distribution of National Income*", Kyklos, vol.24, no.1, 1971, 1-9.
- Keynes, J.M., (1936) "*General Theory of Employment, Interest and Money*", Macmillan Press, London, 1936.
- Kneller, R., Bleaney, M.F. and Gemmell, N., (1999) "*Fiscal Policy and Growth: Evidence from OECD Countries*", Journal of Public Economics, vol.74, no.2, 1999, 171-190.
- Kotlikoff, L. and Summers, L., (1987) "*Tax Incidence*", in: Auerbach, A.J. and Feldstein, M.J., (eds.), "*Handbook of Public Economics, vol.II*", North Holland, Amsterdam, 1987, 1043-1092.
- Laramie, A.J., (1991) "*Taxation and Kalecki's Distribution Factors*", Journal of Post Keynesian Economics, vol.13, no.4, 1991, 583-594.
- Laramie, A.J., (1994) "*The Incidence of the Corporate Profits Tax Revisited: a Post Keynesian Approach*", Merrimack College and The Jerome Levy Economics Institute of Bard College working paper, no.109, 1994.
- Laramie, A.J. and Mair, D., (1993) "*The Incidence of Business Rates: a Post-Keynesian Approach*", Review of Political Economy, vol.5, no.1, 1993, 55-72.
- Laramie, A.J. and Mair, D., (1996a) "*Taxation and Kalecki's Theory of the Business Cycle*", Cambridge Journal of Economics, vol.20, no.4, 1996, 451-464.
- Laramie, A.J. and Mair, D., (1996b) "*The Short-Period Macroeconomic Incidence and Effects of State and Local Taxes*", in: Pola, G., France, G. and Levaggi, R., (eds.), "*Developments in Local Government Finance*", Edward Elgar, Cheltenham, 1996, 135-156.
- Laramie, A.J. and Mair, D., (1997) "*The Macroeconomic Effects of Taxation in Federal Europe*", in: Arestis, P. and Sawyer, M., (eds.), "*The Relevance of Keynesian Economic Policies Today*", Macmillan Press, London, 1997, 1-26.
- Laramie, A.J. and Mair, D., (2000) "*A Dynamic Theory of Taxation*", Edward Elgar, Cheltenham, 2000.
- Laramie, A.J. and Mair, D., (2001) "*Tax Incidence*", in: Holt, R.P.F. and Pressman, S., (eds.), "*A New Guide to Post Keynesian Economics*", Routledge, London, 2001, 41-51.
- Laramie, A.J. and Mair, D., (2003) "*The Effects of Taxation in a Kaleckian Growth Model*", Metroeconomica, vol.54, no.2, 2003, 326-345.
- Laramie, A.J., Mair, D., Miller, A. and Stratopoulos, T., (1996) "*The Impact of Taxation on Gross Private Nonresidential Fixed Investment in a Kaleckian Model: Some Empirical Evidence*", Journal of Post Keynesian Economics, vol.19, no.2, 1996, 243-256.
- Lavoie, M., (1992a) "*Towards a New Research Programme for Post-Keynesianism and Neo-Ricardianism*", Review of Political Economy, vol.4, no.1, 1992, 37-78.
- Lavoie, M., (1992b) "*Foundations of Post-Keynesian Economic Analysis*", Edward Elgar, Cheltenham, 1992.

- Lavoie, M., (1994) "*A Post Keynesian Approach to Consumer Choice*", Journal of Post Keynesian Economics, vol.16, no.4, 1994, 539-562.
- Mair, D. and Laramie, A.J., (2000) "*Capitalism and Democracy in the 21st Century: a Kaleckian Interpretation of a Schumpeterian Problem*", Journal of Evolutionary Economics, vol.10, no.1, 2000, 35-48.
- Maneschi, A., (1974) "*The Existence of a Two-class Economy in the Kaldor and Pasinetti Models of Growth and Distribution*", The Review of Economic Studies, vol.41, no.1, 1974, 149-150.
- Meade, J.E., (1966) "*The Outcome of the Pasinetti-Process: A Note*", The Economic Journal, vol.76, no.301, 1966, 161-165.
- Mendoza, E.G., Milesi-Ferretti, G.M. and Asea, P., (1997) "*On the effectiveness of Tax Policy in Altering Long-Run Growth: Harberger's Superneutrality Conjecture*", Journal of Public Economics, vol.66, no.1, 1997, 99-126.
- Mendoza, E.G., Razin, A. and Tesar, L.L., (1994) "*Effective Tax Rates in Macroeconomics Cross-country Estimates of Tax Rates on Factor Incomes and Consumption*", Journal of Monetary Economics, vol.34, no.3, 1994, 297-323.
- Mieszkowski, P.M., (1967) "*On the Theory of Tax Incidence*", The Journal of Political Economy, vol.75, no.3, 1967, 250-262.
- Mieszkowski, P.M., (1969) "*Tax Incidence Theory: The Effect of Taxes on the Distribution of Income*", Journal of Economic Literature, vol.7, no.4, 1969, 1103-1124.
- Modigliani, F. and Brumberg, R., (1954) "*Utility Analysis and the Consumption Function: An Interpretation of Cross-section data*", in: Kurihara, K.K., (ed.), "*Post Keynesian Economics*", Rutgers University Press, New Brunswick, 1954, 388-436.
- Mott, T. and Slattery, E., (1994) "*Tax Incidence and Macroeconomic Effects in a Kaleckian Model When Profits Finance Affects Investment and Prices May Respond to Taxes*", Journal of Post Keynesian Economics, vol.16, no.3, 1994, 391-409.
- OECD, (2003a) "*National Accounts of OECD Countries, vol.II, detailed tables, 1990-2001*", Paris, France, 2003.
- OECD, (2003b) "*Revenue Statistics, 1965-2002*", Paris, France, 2003.
- O'Connell, J., (1995) "*Indirect Taxes and the Cambridge Model*", Journal of Post Keynesian Economics, vol.18, no.1, 1995, 141-151.
- Pasinetti, L.L., (1962) "*Rate of Profit and Income Distribution in Relation to the Rate of Economic Growth*", The Review of Economic Studies, vol.29, no.4, 1962, 267-279.
- Pasinetti, L.L., (1966a) "*Changes in the Rate of Profit and Switches of Techniques*", The Quarterly Journal of Economics, vol.80, no.4, 1966, 503-517.
- Pasinetti, L.L., (1966b) "*New Results in an Old Framework*", The Review of Economic Studies, vol.33, no.4, 1966, 303-306.
- Pasinetti, L.L., (1989) "*Ricardian Debt/Taxation Equivalence in the Kaldor Theory of Profits and Income Distribution*", Cambridge Journal of Economics, vol.13, no.1, 25-36.
- Perry, N., (2001) "*A Post Keynesian Reconsideration of Environmental Taxation*", University of Western Australia, Perth, paper presented at the 30th Annual Conference of Economists, 23rd to 26th September, 2001.
- Ramsey, F.P., (1927) "*A Contribution to the Theory of Taxation*", The Economic Journal, vol.37, no.145, 1927, 47-61.
- Robinson, J., (1966) "*New Results in an Old Framework: Comment on Samuelson and Modigliani*", The Review of Economic Studies, vol.33, no.4, 1966, 307-308.
- Sala-I-Martin, X. and Sachs, J., (1992) "*Fiscal Federalism and Optimum Currency Areas: Evidence for Europe from the Unites States*", NBER working paper, no.3855, 1992.
- Salí, M., Schneider, O. and Zápal, J., (2003) "*Taxation of Labour and Capital – Theory and its Application on Czech Economy*", Finance a Úvěr – Czech Journal of Economics and Finance, vol.53, no.11-12, 2003. 539-561.
- Samuelson, P.A. and Modigliani, F., (1966a) "*The Pasinetti Paradox in Neoclassical and More General Models*", The Review of Economic Studies, vol.33, no.4, 1966, 269-301.

- Samuelson, P.A. and Modigliani, F., (1966b) "*Marginal Productivity and the Macro-Economic Theories of Distribution: Reply to Pasinetti and Robinson*", The Review of Economic Studies, vol.33, no.4, 1966, 321-330.
- Sawyer, M.C., (1985) "*The Economics of Michal Kalecki*", Macmillan, London, 1985.
- Steedman, I., (1972) "*The State and the Outcome of the Pasinetti Process*", The Economic Journal, vol.82, no.328, 1972, 1387-1395.
- Summers, L.H., (1981) "*Taxation and Capital Accumulation in a Life Cycle Growth Model*", American Economic Review, vol.71, no.4, 1981, 533-554.
- Temple, J., (1999) "*The New Growth Evidence*", Journal of Economic Literature, vol.37, no.1, 1999, 112-156.
- Tobin, J., (1969) "*A General Equilibrium Approach to Monetary Theory*", Journal of Money, Credit and Banking, vol.1, no.1, 1969, 15-29.
- Turnovsky, S.J., (1990) "*The Effect of Taxes and Dividend Policy on Capital Accumulation and Macroeconomic Behaviour*", Journal of Economic Dynamics and Control, vol.14, no.3/4, 1990, 491-521.
- Weintraub, S., (1981) "*An Eclectic Theory of Income Shares*", Journal of Post Keynesian Economics, vol.4, no.1, 1981, 10-24.
- Widmalm, F., (2001) "*Tax Structure and Growth: Are Some Taxes Better than Others?*", Public Choice, vol.107, no.3/4, 2001, 199-219.