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Vertical Inequity in the Unimproved Capital Value System – a case study of Suva, Fiji

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Abstract: Vertical assessment equity is a fundamental requirement of valuation for rating purposes. It can be defined as systematic differences in assessment levels for groups of properties. Inequity can either be regressive when high value properties are paying lower property rates, or progressive if the inverse occurs.

This paper tests the hypothesis that there is an inequity in the present Local Government Rating System in Fiji. There is strong evidence that the present property rate system in Fiji contains both progressive and regressive inequities. The case study demonstrates that the principles advocated in the rating literature are largely supported and applicable to Fiji, demonstrating the weaknesses and vertical inequity of the current Unimproved Capital Value System.

Rider: The views represented in this paper are those of the authors and do not necessarily reflect those of the University of the South Pacific

Vertical Inequity in the Unimproved Capital Value System – a case study of Suva, Fiji

Numerous enquiries into rating and taxing have been conducted throughout the world and the constant outcome has been for the continuance of a rate based on the property value (Meeking, 1994). There is strong support for rating systems based on the property value on the grounds that the form of tax is simple, visible and easily identifiable. The property cannot shift geographically in response to a change in the rate. The yield of tax is predictable and collection is difficult to evade. The cost of maintaining the rate is not high and the rate is a perceptible tax. A deliberate decision is taken to raise the rate in the dollar to meet increased costs of local government services.

There are two primary principles of taxation, the ability to pay and the benefits received (White, 2000). A good property tax should be equitable, neutral, visible, simple and competitive. It should be administratively efficient and provide adequate and stable sources of revenue to a local council. A tax that is fair or equitable should have horizontal and vertical equity. A local council tax (rate) needs to be easily understood by the taxpayers. It should be difficult to evade and avoid. Most importantly, a local rate should be impartial between one person and another. Property tax should provide stable and adequate revenue to support ongoing local council responsibilities and services.

The International Association of Assessing Officers (1992) maintains that a common objective of taxation is neutrality, which should be designed so that it does not distort economic decisions. A uniform broad-based tax is supposed to be neutral and serves to improve economic efficiency. It encourages development, which according to economic theory increases general welfare. High tax on one property shifts investment to others with lower tax. For example, a tax charged on an owner of an apartment building will be passed along to a tenant in the form of higher rents.

Globally three rating systems exist, based on unimproved capital value of land, capital value and assessed annual market rental value (McCluskey *et al*, 1997). The first two systems may be viewed as partial wealth taxes whereas assessed annual value may be seen as an attempt to tax the current yearly income from properties. Each country should evolve its own system appropriate to its cultural values, historical background and political situation. The choice of tax system should be linked directly with the land tenure system and the most common form of land holding.

Researchers in the field believe that the property rating system is an intervention in the urban land market and affects land use (Elliott and Zulu, 2000). Different property rating systems have been offered to encourage different outcomes with respect to property development. For example, the site value basis encourages a quicker development response and minimises holding cost. In addition, this system discourages land speculation that is holding back unimproved or under-improved property from use. This would bring the highest current returns in order to reap the advantages of a higher sale price or higher annual returns without any substantial capital investment. It discourages urban decline resulting from neglect and under utilisation of buildings and other resources by property owners through lack of capital investment.

Studying a local council rating system of a country is an important subject and it is highly desirable to examine whatever empirical information is available locally and abroad. Relevant information does not often provide institutions that conform to ideal types. The reasons are that property rate is a product of natural, cultural and historical circumstances, which vary in time and place. Consequently property tax systems differ among states and countries at a given time and vary for each state and country with the passage of time.

Before independence Fiji was under British rule (1874 -1970) and shared in some significant aspects of a common colonial heritage with its neighbouring countries Australia and New Zealand. Being part of the former British Empire, the three countries were administered through a similar legal, political, economic and institutional structure. Thus the basis for assessing local government rates in Fiji on the Unimproved Capital Value System (UCV) was inherited from these two countries. Meeking (1994) suggests that UCV was popularised in Australia in the late nineteenth century by Henry George. George believed in the notion of rating on land values, as a means of encouraging development. It is a part of the unearned increment on the value of the land returned to a community.

This paper contextualises the framework of local councils in Fiji before investigating the literature on the three global rating systems, looking at experiences of other developing countries and neighbouring Australia and New Zealand. The paper then reports on empirical research that tests the differences between rates derived under the Unimproved Capital Value (UCV) and Capital Value (CV) rating systems, considering their suitability and equity in a Fiji context. The Annual Rental Value (ARV) system was excluded from the analysis given the difficulties in applying such a system to the residential sector where rental property rents are controlled under the Counter Inflation Act, thus distorting the market and compromising an ARV system.

Local Councils in Fiji

Metropolitan areas in Fiji comprise two cities and ten towns. The locations of these councils are shown in Figure 1. The major urban centres are classified as cities or towns under the Local Government Act (1972, Cap. 125) and are administered by councils elected by the eligible population residing within proclaimed boundaries. The Ministry of Local Government, Housing and the Environment have overall responsibility over municipal government.

All areas outside the jurisdiction of proclaimed cities, towns and Fijian villages come under the purview of the rural local authorities, which are public health authorities constituted under the Public Health Act (Cap. 111). Their primary responsibility is to control public health, building construction and other matters governed by The Public Health Act. Many of them have considerable peri-urban housing development power but they have no rating powers even though under the Town Planning Act they are the planning Authority for their areas. The Central Board of Health, constituted by the Minister for Health, maintains overall coordination of the activities of the rural local authorities.

Local government was first established in Fiji under the Towns Ordinance of 1877. The Town of Levuka was proclaimed under this legislation. As a result of the changing economic geography of Fiji after the introduction of indentured labour from India and of the need for a deep-water harbour, an urban centre was established at Suva, the present capital. Suva was proclaimed a Town in 1881.

Figure 1: Local Councils in Fiji

Source: Fiji Ministry of Lands, Suva

The local councils are required under the Local Government Act (1972) to do all such things lawful and expedient to promote the health, welfare and convenience of the inhabitants of the municipality and to preserve amenities. Specific functions of the local councils that are elaborated in the Act include public utility services, purchase of land and dealings in land, housing schemes to provide dwellings for persons of small means, streets and drainage. Under these broad provisions, councils undertake a large variety of developmental works and services.

For public amenities the councils construct and maintain public conveniences and swimming pools. Some council provide library services but many have found them to be expensive to maintain efficiently but have continued to provide this service as a public amenity. Most of this work is funded from the rates revenue. Hitherto, the only review of rating systems in Fiji was carried out by Narayan (1999) on behalf of the Government.

Comparing Rating Approaches – Unimproved Capital Value

Australia and New Zealand provide an unusual opportunity for observing and studying different methods of property taxes in operation, often side by side. In both countries tax is levied based on land value alone as well as on land and building. The State governments in Australia administer most of the assessment of property tax while in New Zealand this power is retained by the national government.

It is of interest to note that several countries have changed their rating system from a Capital Value to an Unimproved Capital Value (Becker *et al,* 1969). Jamaica as a poor developing island nation is similar to Fiji in many ways and achieved independence in 1962. For a poor developing country, to improve the existing economic situation the best option is to introduce the Unimproved Capital Value rating system (Becker *et al*, 1969, p. 242). The advantages of an Unimproved Capital Value (UCV) system are that it encourages development of land and stimulates construction work. Under an UCV system, property owners will get the benefits but they would not undertake expenditure or expend effort to account for the enhancement in values.

The UCV method taxes an unearned increment. Revenue in the form of income raised is redistributed and economic decisions are not affected. Commenting on the UCV system, Becker *et al* maintains that in several under-developed countries a large number of unimproved, or vacant site sales are still available and could easily be used to establish UCV for developed sites. However, much has happened in developing countries in the intervening 34 years, and there are fewer comparable undeveloped sites available. In many developing countries, decisions on land use show several values but not that which is reflected in the market. For instance, the sentimental attachment to a large subsistence holding may lead the owner to withhold the land from subdivision or sale. Taxing such a holding on the unimproved capital value system may force such a landowner to make a more rational decision on holding back his land. Of course it may just cause them to be filled with bitter resentment against the local authority.

Some of the sales evidence (Becker *et al*, 1969) is treated as vacant because of the poor condition of the structural improvement existing on the site or the improvement may have become obsolete, adding little value to the hereditament. Analysis of these types of sales will provide a basis to establish land values.

In many cases the expansion of towns, or a locality of a town, has resulted in the increase in value of the surrounding land. The increase in value of land occurs before development commences. It is due to the anticipation that the land will be able to find a higher use in the future as a result of beneficial planning permission that would be worth more than its present value. George (1992, p.425) summarised the difficulty in generating suitable revenue from land: "*Separate the value of the clearly distinguishable improvements made within a moderate period, from the value of land, should they be destroyed. This manifestly is all that justice or policy requires. Absolute accuracy is impossible in any system and to attempt to separate all that the human race has done from what nature originally provided would be as absurd as impracticable. The fact is that each generation builds and improves for itself and not for the remote future. In addition, the further fact is that each generation is heir not only to the natural powers of the earth, but to all that remains of the work of past generations*."

McCluskey *et al* (1997) describe the land value basis of taxation as favourable because of its potential for improving the efficiency of urban land use. They argued that this form of taxation is straightforward if land alone is taxed; the owner will have an incentive to develop the land to its most effective use. They further support Becker's argument that the site value system is most suitable for developing countries. Tricket (1982 p. 237) stated that the concept of Unimproved Capital Value is the product of an unsophisticated economy. Such a view would support its adoption in developing countries. He pointed out that this was the reason why the UCV system was adopted in most of the Australian States in the early stages of their development. The belief is that this system has a particular philosophical attraction to those

responsible for the development of a largely undeveloped state. The UCV rating system is seen as a positive step in encouraging development and settlement on land.

The Unimproved Capital Value system (Mander, 1982 p. 240) is a system that encourages development because it exempts improvements and taxes the 'community' created unearned increment. However, the system disregards the owner's ability to pay and penalises properties tied to their older use in changing use situations. The UCV system does not have any degree of vertical equity. Vertical equity refers to any difference in tax burden borne by taxpayers who are not similarly situated.

Capital Value System

The use and application of the Capital Value (CV) system is increasing in importance, especially in those countries where the market for property transactions is conducted on a capital value basis (McCluskey *et al* 1997). This approach produces a buoyant tax base, as capital values are more volatile than other rating systems. The CV system requires property be assessed to its highest and best use, that is, full market value disregarding its present use. On this basis, it captures the *potential* wealth of taxpayers. The system provides the best means to achieve equity between ratepayers based on their ability to pay. In addition, ratepayers easily understand this rating system, satisfying the basic test of a rating system that ordinary ratepayers can identify with it. According to Petherick, (1982 p. 253) Capital Value is the only system that an ordinary ratepayer can understand. Capital Value is connected to market prices with which the landowner is familiar.

The underlying principle of a property tax is that it is an *ad valorem* tax (IAAO, 1997). This means that the tax is based on a property value. In any fast growing economy, property values change more frequently and values in one area may rise whilst in other areas they may fall or stabilise. Property taxes, in such cases, will shift to areas where the wealth increases and can be measured by the price at which property changes hands. Only the current market value approach will reflect these changes in the local economy and the distribution of property related wealth. Current market value is assessed on the basis of values prevailing in the market, thus maintaining a consistent relationship between property values and property taxes. The absence of market sales evidence would result in a highly subjective process.

A report on rating (Petherick, 1982 p. 254) to the Premier of South Australia in February 1980 concluded: "*It is clear to the working group that an ordinary land or property owner does not understand what is meant by the term "unimproved" and "annual" values as used for property rating and taxing purposes. These value bases were enacted in the 1800's one having regard to the land as virgin and the other an adoption of an old English system of using payments of rents as the best measure of the benefit derived from the occupation of land. Neither term is applicable any longer since there is now virtually no truly virgin land available for sale as a guide to unimproved values and practically all rateable properties in South Australia are owner-occupied so there is no real rental evidence on which to make annual assessments*."

Mander (1982) claims that the CV system provides the best means to achieve equity between ratepayers based on their ability to pay; the ratepayers more readily understand it with the clear measure of the market easily demonstrated and always before them. It generates fewer objections than other systems; those districts using 'Capital Value' rating in New Zealand have never been able to discern any difference in development from those districts using

'Land Value'. The traditional theory regarding the effects of taxing improvement is in fact, in practical terms, not a disincentive to development.

In some countries a property is re-valued only when it sold and it is valued at the reported sale price (Dillinger, 1991). In the absence of reliable sales information, land can be valued based on the sales data and the buildings valued separately using information from the construction industry. The buildings are valued based on the construction cost, which includes the cost of materials obtained from the timber yard, hardware stores plus labour cost. This source again may not be reliable to establish the market value of rateable property.

In many countries the state agency is responsible for administering a tax on property taxation and licensed Registrars of Deed are required, under the law, to inform the valuers of all recent transactions (Dillinger, 1991). The taxing authorities depend on the cost data supplied by the local contractors or compilations from the professional journals of the building industry. These data may not be accurate, but the taxing authorities use it to arrive at the cost per square metre of a particular type of building. Different types of floorings, plumbing, furnishing and electrical facilities and a subjective estimate of the quality of repair and obsolescence may not all reflect the true value of a building but they are taken into consideration. These adjustment factors can dramatically affect property values, as they were not determined by analysis of the costs related to the market that exist in the market.

It appears that in developing countries (Dillinger, 1991) the opportunity to improve the accuracy and objectivity of individual valuation is yet to be fully exploited. In many countries where the Capital Value system is used, a valuer has no alternative but to seek information from real estate agents or contractors to fix property values. To avoid high tax, property-dealing parties understate the prices in official documents. This would mean that the taxing authorities could not rely on official property dealing documents. However, to counter this problem a government can set up a valuation commission consisting of real estate agents and prominent property owners who come up with realistic information based on their professional expertise.

Another problem with Capital Value system (McCluskey *et al*, 1997) is that while it starts with a systematic ordering of the data, it then overloads data with arbitrary adjustment factors. Market prices of specific properties in various locations are determined and grouped by neighbourhood. Their respective dimensions, showing the unit value of property according to a neighbourhood are established and a variety of adjustment factors are then imposed. However, there is no evidence that the value attached to these adjustment factors is based on the analysis of market conditions. Having all property taxed on a capital value basis could lead to a system where there is a lack of market information and sales data. This is more of a problem within commercial and industrial sectors where capital assessments would have to be extrapolated from a very weak rental transaction base.

According to McCluskey *et al* (1997) in the Capital Value system current market value attached to the property is generally based on arguments about the ability to pay. If value rises rapidly in a retirement community where most of the property owners are on fixed or limited incomes, rising tax may then force people to sell their homes. This creates social distress. However, from an economic perspective, property owners with higher values have greater wealth in the form of unrealised capital gains, which can be converted into income in several ways that can avoid the loss of property. For example, the burden of increasing

property tax due to increasing value can alleviate hardship through specific or selective exemptions and controls.

Assessed Annual Rental Value

Such a tax is levied on the estimate of the rental value of the property and is normally an occupier's tax; it is paid from income rather than capital wealth (McCluskey *et al*, 1997). Rental price is negotiated based on the existing/current use of the property and not based on some future or potential use. The existing use approach does not penalise the non-use of the property. It also does not permit an inappropriate use. Valuing vacant property under this system is not a problem as it is valued based on a use to which it can be put without additional structural or planning changes. The Annual Rental Value (ARV) system is based on an openly negotiated market rental, requires that there are a number of transactions if the assessment is to be regarded as reliable. The quality of market transactions can be eroded by rent controls, which constrain the levels of rent to statutory limits and increase level of owner occupation in an extremely active capital market.

In the ARV system, the actual occupant of a rateable property is regarded as a possible hypothetical tenant but the rent he pays is not necessarily the measure of the annual rental value for rating purposes. This demonstrates that the rent actually paid is not the measure of rateable value or even conclusive evidence of value at the date when the rent was fixed. However, if a rent payable under a yearly tenancy has been fixed recently without payment of any premium or the like, it may be taken as *prima facie* evidence and is not liable to be rebutted. It can only be rebutted on the grounds such as fraud, personal consideration, lack of reference to the true state of the market and the actual inclusion of goodwill.

The other problem associated with the Annual Rental Value (ARV) system is the impact of rent control. In many South Asian countries, and in Fiji, rent control regimes freeze rental based on historical data. The rents on new tenancies can be set at market levels, but there are restrictions on any subsequent increases. As a result, this measure would slow the rate of increase in rents compared to an open market or uncontrolled situation. If adopted by the rating authority, it would slow the growth of assessed values. In effect, rent controls constitute a *de facto* exemption of the older properties from the property tax. In Fiji the rent is controlled under the Counter Inflation Act (1973) and Unimproved Capital Value (UCV) system. The landlord can charge rental to a maximum of six percent of UCV. Having this method of rent control shifts the tax burden onto more recently built properties. Thus the owners or occupants of new structures are subsidising the tax burden of older property owners. In countries where rent control is in force the properties are valued not on the basis of rent control but on 'hypothetical market rental' based on the analysis of rental value in the uncontrolled sector of the market (Dillinger, 1998). In many cases the tenants are not providing the true information, so a valuer has no choice but to value a rented property on the basis of actual rental paid. In the process it is required to seek rent figures including actual receipts from the occupants. There is potential for the occupants to collude with the property owners and understate rental information by submitting false receipts.

Dillinger (1998) reports that valuers have two choices, either to accept a declaration known to be false or make a counter proposal under the law. The valuers can have their own estimate of a property rental value if they believe the figure supplied by the occupant is false. However, in the absence of a credible basis for preparing a counter proposal, the valuers are in a weak position to defend a high valuation. Instead of having to go through lengthy court cases, local

authorities would rather negotiate valuations down to a level that is agreeable to the taxpayer. Fixing values based on direct market data results in under-valuation, therefore disparities between actual rents and reported rents reflect the skills and rewards of the two negotiating parties. To overcome this difficulty, many countries that have Annual Rental Value (ARV) system exploit other sources of accurate rental information or provide landlords/tenants with incentives to supply accurate data, such as registered rental contracts, although this can be fraught with difficulties.

Finding a way forward

In every country, differing systems have their supporters and their critics. In reviewing the current UCV based system in Fiji there are many significant anomalies that demonstrate the insensitivity of the UCV system to vertical inequity as well as the taxpayer's ability to pay. A classic example in Suva City is the landmark Reserve Bank Building and the adjacent car park, of similar lot areas thus both paying the same City Rate. One is a vacant lot, currently underdeveloped and underused as a car park, whilst the adjacent site places a far higher demand on city services as a prime landmark office building. The literature indicates that the Capital Value system provides the best means to achieve rating equity.

A survey was conducted to test the hypothesis that the UCV rating system currently applied in Fiji is lacking equity. Using Natural Sampling, sales data over a five-year period (1995-1999) for improved residential properties within the City Council area was collected and analysed. This involved a comprehensive survey in the Suva City to investigate the holistic characteristics of the actual situation. The study required testing the equity in rates provided under the UCV method. The disadvantages associated with the UCV method of rating as identified from the literature are that it is insensitive to vertical equity and to the taxpayer's ability to pay. Vertical equity refers to the belief that taxpayers with greater ability to pay ought to face higher tax burdens than those with lesser ability. There are two examples of vertical inequity, progressivity and regressivity in the property tax structure (Sunderman *et al,* 1990 p.320). Progressivity occurs when the ratios tend to increase for higher property values, whereas regressivity in the tax structure occurs when the ratios tend to decline with increasing property values. In general, statistically significant vertical inequity is not acceptable.

Vertical equity assumes that a tax should be progressive to be fair (White, 2000 p. 17). As has been demonstrated, the identical adjacent plots of land may have the same UCV, but in terms of development they greatly differ and may be producing significantly different levels of revenue to the property owner. In the UCV system ratepayers are required to pay the same amount of rates irrespective of the level of development of buildings on the site and the capital value of the property. This leaves many owners dissatisfied with the rates they are required to pay. To maximise fairness and understand ability in a property tax system, assessment should be based on the current value of property. Under a current market value standard it is easier for the public to understand whether they are being treated fairly (McCluskey *et al* 1997, p.9).

A further objection to the UCV system is based on the grounds that the real value is assessed on the highest and best use of the land, not actual use. In Fiji the condition is even more critical as UCV is assessed on the present zoning of the land as defined under the Section 63 of the Local Government Act (1972) and not on the actual usage.

There are 10,461 rateable properties in the Suva City of which 8,786 (84%) are zoned residential. A total of 606 properties (7% of the total residential stock) were included in the total residential sales transaction data for the five-year longitudinal data analysis. Residential properties were taken as the prime study focus given as the social and political impact on rating equity is most significant in this sector. Commercial and industrial represent only 8% and 6% stock respectively, albeit that individual property values may be significantly higher. Other types of rateable properties such as civic, recreation, educational and special uses will not be as affected because of the rate concession and exemption provided by the Council.

The identification number given to each for rating purposes by the government valuers identified each property. The Capital Value for each property was derived from the sales information obtained from the Lands Department for the period 1995 - 1999. It was matched with the identification number on the valuation roll kept at Suva City Council. The Unimproved Capital Value adopted in the research was the actual figure fixed by the government valuers during the revaluation of Suva City in 1999. The rate figure (0.024 cents in $1) on each property was obtained from Suva City Council as was levied in 1999.

This exercise seeks to establish the difference in the rates payable by the two methods. The property rates are assessed using Unimproved Capital Value and Capital Value. The null hypothesis states that there is no statistically significant difference between the rates on properties assessed by two methods with different capital values. The alternative hypothesis states that different methods significantly change the amount of rate payable.

Analysis of Variance – Suva residential properties

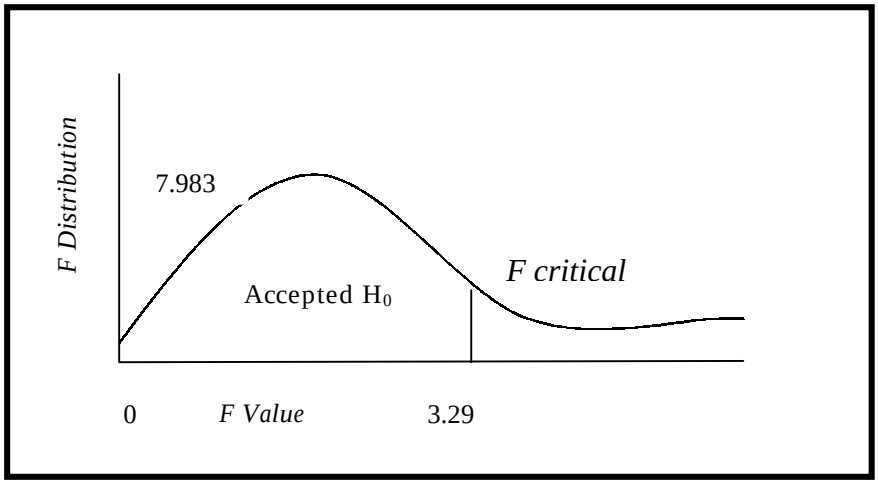
The analysis of variance (ANOVA) provides a general framework for statistical testing based on careful examination of the different sources of variability in a complex situation. The analysis of variance uses an *f* distribution based on *F critical*, a ratio of two variance measures to perform each hypothesis test. The numerator represents the variability due to that special interesting effect being tested and the denominator represents a baseline measure of randomness. If the ratio is larger than the *F critical* the effect is significant. The one way analysis of variance as has been carried out in this case is used to test whether the averages from different situations (Capital Value) are significant from one another or not.

A graphical simplification is provided in Figure 2. Since the *F value* is 7.983 is greater than 3.29, therefore the null hypothesis is rejected and the alternative hypothesis is accepted. However the *null hypothesis* (H_o) is accepted if the *F value* falls between 0 and 3.29. To obviate the consultation of *F* tables, Microsoft Excel output also provides a *P value*. This value indicates that given the statistics *F value* as in this example is 7.983, the probability that the *null hypothesis* is true is 0.006242. For the *F value* to indicate that there is a significant difference amongst the three treatments, the *P value* has to be less than level of significance. In this case the level of significance is 0.05 (5%).

The computer output (see Appendices) shows ANOVA tables (Tables 1-14) for this data analysis using standard format for reporting ANOVA results. Any sample chosen from a population is likely to differ simply due to sampling error. They will have slightly different means and standard deviations. The use of ANOVA clarifies whether the difference between the samples is simply due to chance (sampling error) or whether there are systematic treatment effects that have caused scores in one group to be different from the scores in other

groups. In this research the researcher has investigated the level of council rate payable in relation to the capital value of a property.

Figure 2: *F Distribution* Chart



Source: Cassel and Symon (1994, p. 299)

In the process of this testing the null hypothesis states that there is no statistically significant difference in the rate between the groups of properties. The alternative hypothesis states that different methods produce different rates in the groups of properties. The first step in the process determines the total variability for the entire set of data. This is shown as *variance* in the Tables 1-14. This is achieved by combining all scores from the samples to compute one general measure of variability. Having completed that it is broken into its separate components.

There are two basic components of the general variability between all the properties in the test:

a) *Between test variability*. This variability is due to the differences between treatments conditions. It is reflected in variability between sample means.
b) *Within treatment variability*. There is variability within each sample as each property within a sample produces a different result from others in that sample.

However, there can be no variability due to treatment effects within treatment conditions as all samples are treated exactly the same. In this case all properties are charged the same rate (0.24 cents in $1). Once the total variability is broken down into its basic components and analysed, it is possible to compare them by computing a statistic called *F distribution* (shown as *F* in the Tables 1-14).

$$F = \frac{\text{Variability between treatments}}{\text{Variability within treatments}}$$

or,

$$F = \frac{\text{Treatment effect + individual differences + experimental error}}{\text{Individual differences + experimental error}}$$

The single difference between the numerator and the denominator is variability caused by the treatment effects. If the null hypothesis is true, then the numerator and denominator are the

same because there is no treatment effect. The *F distribution* would then be the same as *F critical*. If the null hypothesis were false, then the treatment would have effect and the *F distribution* would be greater than the *F critical*.

In ANOVA for calculation purposes *MS* is used for sample means. *SS* is the sum of squared deviations from the sample means. The *F distribution* is composed of two variations, both computed from the sample data. The variance between treatments is the numerator and the variance within treatment is the denominator. To compute the final *F distribution*, *SS* and a *df* (degree of freedom) for each of the two variances is used. Thus the process of analysing variability occurs in two parts. Firstly *SS* has to be computed for the total experiment and analysed it into two components, between and within. Secondly *df* is calculated for each component.

As indicated above, when the null hypothesis is true the *F distribution* and *F critical* would be the same (numerator and denominator are measuring the same variance). So, how far does the *F distribution* have to be away before it can be said that there is a significant effect from the treatment? To arrive at this answer one has to look at the *F distribution*. *F distribution* depends on the degree of freedom (*df*). In this research *df* = 0.05; it is the critical cut off point. If the values piled up around the critical value, then the difference is not significant. Dividing *SS* by *df* the mean square (*MS*) is determined by dividing *SS* by the *df*, showing the variability between samples and within samples. *F distribution* is derived by dividing the factor *MS* by the error *MS* produces. The level of significance is indicated by the *P* value. If the *P* value is less than *df* (0.05 in this instance), then the level of difference is highly significant.

Analysis of the data using ANOVA has produced significant results that are summarised in the Figures 2 and 3. Two critical data sets (*F distribution* and *F critical*) have been extracted from the Tables 1-14 and plotted on these graphs to show the level of difference in the rates payable on properties having different capital values. To carry out the test, rateable values and rates payable on 606 properties located within Suva City were assessed. The Capital Value of the properties were based on their sale prices within the period 1995 to 1999 and the Council Rate was determined at the rate of 0.24 cents in $1, the actual rate as levied by the City Council in 1999. To facilitate analysis, the properties were divided into seven categories, based on seven value ranges as follows:

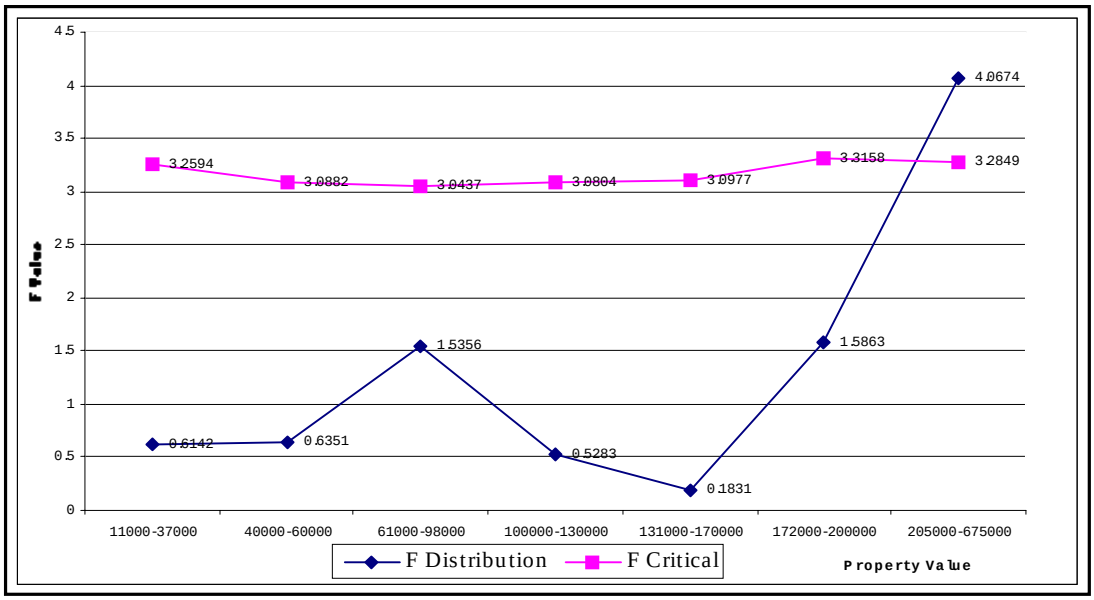
- $11,000 – 37,000
- $40,000 – 60,000
- $61,000 – 98,000
- $100,000 – 130,000
- $131,000 – 170,000
- $172,000 – 200,000
- $205,000 – 675,000

It is possible to have a larger variation in the *F distribution* and *F critical* if the grouping is reduced. It was not necessary to equally distribute the properties among the seven groups.

Under the Unimproved Capital Value System (Figure 3), the *F distribution* is below the *F critical* in all the groups of properties except the most expensive ($205,000 – 675,000). In six cases the *F distribution* is well below the *F critical* values thus proving that all groups are paying almost the same amount of rate. However the level of significant in the group

($205,000- $675,000) is also not great as the *F distribution* is 4.0674 and the *F critical* is 3.2849.

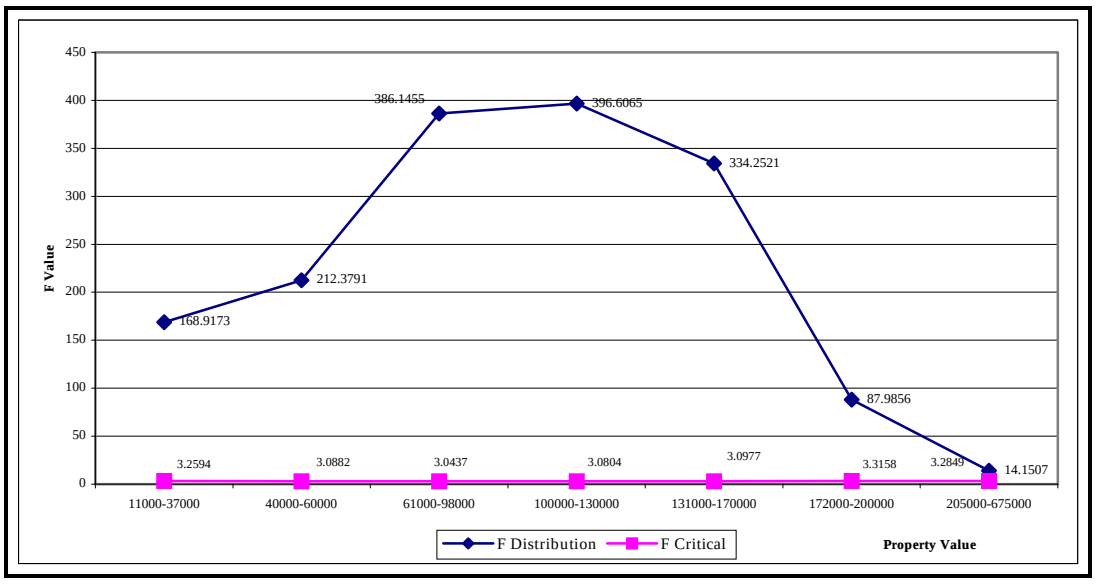
Figure 3: *F Distribution* and *F Critical* using the Unimproved Capital Value (UCV) Method



Source: Hassan & Boydell, for this research

Under the Capital Value system (Figure 4), the *F distribution* is greater than the *F critical* in all groups of properties. *F critical* varies from 3.0437 to 4.0674 and the *F distribution* ranges from 14.1507 to 396.6065. This shows that under the CV system, the difference in the rate is significant in all groups of properties, with the largest differences are shown on three groups of properties that have capital values ranges from $61,000 – 98,000, $100,000 – 130,000 and $131,000 – 170,000. The level of difference reduces as the CV reaches the higher groups $172,000 – 200,000 and $205,000 – 675,000 respectively. A lesser degree of variation is also noted on properties that have value ranges from $11,000 – 37,000 and $40,000 – 60,000.

Figure 4: *F Distribution* and *F Critical* using the Capital Value (CV) Method



Source: Hassan & Boydell, for this research

Conclusion

This paper questioned the vertical inequity in the current UCV approach to rating assessment currently adopted in Fiji's municipalities. The method has come under criticism in recent years, but this paper represents the first empirical analysis using actual transaction data of residential properties in Suva City. The analysis of effective tax rates between properties clearly shows that there is a lack of equity in the adoption of the Unimproved Capital Value (UCV) approach. Whilst the literature offers an alternative in the Annual Assessed Rental Value (ARV) approach, however as discussed this is not appropriate in Fiji where the Counter Inflation Act regulates rentals. All indicators show that to overcome equity issues, the rating method should be changed to a Capital Value (CV) approach. Under the CV system, more intensively developed commercial properties with high capital values would explicitly pay higher local rates, which given their relative demand on services compared to modest residential housing stock. The data indicates that the CV method is less discriminatory than the current UCV methodology, and the literature suggests its easier acceptance and understanding by ratepayers.

Whilst this study supports a move to the CV method, it is important to undertake further research before moving headlong into accepting such an approach. The most critical question is the cost of administration of a new CV approach in relation to the potential increased tax yield. Additionally, there are associated costs in maintaining the currency of the assessed values, particularly in times of high inflation. Moreover, at the current time Fiji lacks available suitably trained professional and technical personnel to facilitate the relatively smooth transition to a new system.

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Appendices: ANOVA *F Distribution* Tables

Tables 1 – 7 assess using the Unimproved Capital Value System.
Tables 8 – 14 assess using the Capital Value System.

F distribution under Unimproved Capital Value System

Table 1 – F DISTRIBUTION ON PROPERTIES VALUED $11,000 - $37000

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
a	13	1888.8	145.2923	16783.31
b	13	1716	132	7209.6
c	13	2260.8	173.9077	5127.951

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	11924.38	2	5962.191	0.6142	0.5466	3.2594
Within Groups	349450.3	36	9706.954			
Total	361374.7	38				

Table 2 – F DISTRIBUTION ON PROPERTIES VALUED $40,000 - $60,000

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
a	34	14020.8	412.3765	20277.11
b	34	15343.2	451.2706	56087.21
c	34	15367.2	451.9765	6115.626

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	34922.65	2	17461.33	0.6351	0.5320	3.0882
Within Groups	2721838	99	27493.32			
Total	2756761	101				

Table 3 – F DISTRIBUTION ON PROPERTIES VALUED $61,000 - $98,000

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
a	64	32666.4	510.4125	34511
b	64	36124.8	564.45	61147.22
c	64	35851.2	560.175	17179.38

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	115512.18	2	57756.09	1.5356	0.2180	3.0437
Within Groups	7108769.07	189	37612.53			
Total	7224281.25	191				

Table 4 – F DISTRIBUTION ON PROPERTIES VALUED $100,000 - $130,000

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
a	37	22869.6	618.097297	38461.63
b	37	22346.4	603.956757	20721.67
c	37	23805.6	643.394595	24700.92

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	29541.43135	2	14770.7157	0.5283	0.5911	3.0804
Within Groups	3019831.939	108	27961.4068			
Total	3049373.371	110				

Table 5 – F DISTRIBUTION ON PROPERTIES VALUED $131,000 - $170,000

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
a	31	26925.6	868.5677	1914538
b	31	23392.8	754.6065	41848.23
c	31	23772	766.8387	32267.85

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	242684.532	2	121342.3	0.1831	0.8330	3.0977
Within Groups	59659626.2	90	662884.7			
Total	59902310.8	92				

Table 6 – F DISTRIBUTION ON PROPERTIES VALUED $172,000 - $200,000

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
a	11	9208.8	837.1636	68584.11
b	11	8179.2	743.5636	73319.98
c	11	11637.6	1057.964	400235.7

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	573323.5	2	286661.8	1.5863	0.2214	3.3158
Within Groups	5421398	30	180713.3			
Total	5994721	32				

Table 7 – F DISTRIBUTION ON PROPERTIES VALUED $205,000 - $675,000

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
a	12	10512	876	55692.92
b	12	13747.2	1145.6	130094.7
c	12	14376	1198	78429.03

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	716455.7	2	358227.8	4.0674	0.0264	3.2849
Within Groups	2906383	33	88072.2			
Total	3622838	35				

F distribution under Capital Value System

Table 8 – F DISTRIBUTION ON PROPERTIES VALUED $11,000 - $37,000

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
a	13	4878	375.2308	5883.692
b	13	8040	618.4615	4050.609
c	13	10728	825.2308	1779.692

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	1319130	2	659565.2	168.9173	0.0000	3.2594
Within Groups	140567.9	36	3904.665			
Total	1459698	38				

Table 9 – F DISTRIBUTION ON PROPERTIES VALUED $40,000 - $60000

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
a	34	37932	1115.647	10162.78
b	34	46164	1357.765	3492.064
c	34	48960	1440	0

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	1933336	2	966667.8	212.3791	0.0000	3.0882
Within Groups	450609.9	99	4551.615			
Total	2383945	101				

Table 10 – F DISTRIBUTION ON PROPERTIES VALUED $61,000 - $98,000

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
a	64	106542	1664.7188	14135.92
b	64	121920	1905	9915.4286
c	64	138549.6	2164.8375	7055..6329

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	8007879.885	2	4003939.9	386.1455	0.0000	3.0437
Within Groups	1959739.807	189	10368.994			
Total	9967619.693	191				

Table 11 – F DISTRIBUTION ON PROPERTIES VALUED $100,000 - $130,000

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
a	37	90648	2449.945946	4172.108108
b	37	100152	2706.810811	5892.324324
c	37	111000	3000	11136

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	5605487	2	2802743.351	396.6065	0.0000	3.0804
Within Groups	763215.6	108	7066.810811			
Total	6368702	110				

Table 12 – F DISTRIBUTION ON PROPERTIES VALUED $131,000 - $170,000

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
a	31	102972	3321.677	4458.426
b	31	111100.8	3583.897	3438.41
c	31	120840	3898.065	15274.53

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	5163385.27	2	2581693	334.2521	0.0000	3.0977
Within Groups	695140.9548	90	7723.788			
Total	5858526.225	92				

Table 13 – F DISTRIBUTION ON PROPERTIES VALUED $172,000 - $200,000

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
a	11	46476	4225.091	4275.491
b	11	49092	4462.909	19597.09
c	11	52368	4760.727	3141.818

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	1584585	2	792292.4	87.9856	0.0000	3.3158
Within Groups	270144	30	9004.8			
Total	1854729	32				

Table 14 – F DISTRIBUTION ON PROPERTIES VALUED $205,000 - $675,000

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
a	12	64598.4	5383.2	89682.15
b	12	74571.6	6214.3	73288.27
c	12	105552	8796	7894499

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	76012423.8	2	38006212	14.1507	0.0000	3.2849
Within Groups	88632162.6	33	2685823			
Total	164644586	35				