Work Shop to Present Revenue Forecasting Models

Novotel Hotel

August 20th, 2003

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Sigma One Corporation

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Presentation by Dr. Graham Glenday for the Duke Team

Work Shop Report by:

MaUb Facilitators

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In fulfillment of the following milestones:

6.3(Y5) One Seminar held in Ghana per year

August 2003 **Sigma One Corporation**

REPORT ON ONE-DAY WORKSHOP ON TAX ADMINISTRATION & REVENUE FORECASTING. WEDNESDAY 20-08-2003

INTRODUCTION

Sigma One Corporation contracted Duke University to assist the Revenue Agencies Governing Board with efforts to improve revenues and revenue forecasting in Ghana. The outcome was improved models to estimate future revenues, explore optimal tariff and tax structures and suggestions on a tax policy unit to assist with developing revenue structures that support Ghana's economic growth objectives.

The Duke University team from the Duke Center For International Development worked in close collaboration with the RAGB and the revenue agencies. Many Ghanaians have undergone training in various aspects of tax administration & revenue forecasting at the Duke University and in Ghana over the past two years. The training forms part of the capacity building necessary for the successful implementation and operation of an efficient Tax and revenue forecasting system and the development of a Tax Policy Unit.

THE WORKSHOP

On August 20th, 2003 RAGB in collaboration with Sigma One Corporation hosted a workshop for Duke University to present its work to interested stakeholders. The Deputy Minister Of Finance and Economic Planning, Dr. Akoto Osei, made the opening remarks and reminded everyone present that revenue generation can only be enhanced by improved revenue forecasting methods to gauge the "revenue gap" between what can be collected and what is being colleted in the form of various taxes and tariffs. He also pointed out the robust revenue models allow to carry out tax policy sensitivity analysis, prior to the decision to change the tax structure.

OBJECTIVES

The objectives of the workshop were:

- Duke University:
    - To communicate Models developed to the various partners i.e. RAGB & Revenue Agencies.
    - To share Best Practices in Tax Administration
    - Make recommendations as to the next steps
- RAGB:
    - To share their observations as they gathered and analyzed data on the ground

PARTICIPANTS

Participants were drawn from various government agencies including, the Commissioners and staff of Customs Exercise & Preventive Service, the Internal Revenue Service, the Value Added Tax Service, staff from the Ministry of Finance and Economic Planning, the Ministry of Trade and Industry and President's Special Initiatives, the University of Ghana at East Legon, the Private Enterprise Foundation and the Center For Policy Analysis.

The complete Power Point presentation at the Work Shop is attached.

Issues Discussed in the Discussion break

The following issues were raised.

a. Most of the staff of the Revenue Agencies who are mandated to collect and process data lack basic programming skills, as a result the process of data collection is cumbersome.
b. The public do not appreciate data, therefore it is very difficult to get basic information from the public
c. Poor record keeping practices are prevalent

d. Lack of or limited follow up on registered companies and organizations which leaves gaps in data (some companies exist only on the files of the revenue agencies).
e. Data eliciting forms and sheets does not always capture data that can be analyzed.

CONCLUSION

The process of revenue forecasting must be a collaborative effort between and among the various stakeholders. There is the need to develop capacity of the people, develop data that is accurate and usable, and make a continued effort at refining the processes that go into tax administration and revenue forecasting.

Duke University

DCID

DUKE CENTER FOR
INTERNATIONAL DEVELOPMENT
in conjunction with
SIGMA ONE CORPORATION

Building Tax Analysis and Revenue Forecasting Capacity in Ghana

OVERVIEW

- The problem
- Introduction to the project
- Capacity Building Steps
- Overview of revenues
- Difficulties in revenue forecasting
- Types of model
- Data and models for
  - Customs
  - Income tax
  - VAT
- Building organizational and systems capacity

The Problem

- Revenues and revenue forecasting are core to budgets and budgeting:
  - creating predictability in expenditure programs
  - reducing deficits and creating own-resource sustainability
  - avoiding unexpected deficits and borrowing
- Tax analysis and revenue forecasting **(TARF) capacity** are core to revenue side of fiscal policy management
  - tax policy formulation
  - revenue estimation
- Government does not have well established capacity in tax analysis and revenue forecasting
- How to build this capacity? Major co-operative effort.

Introduction to the project

- Two phases
  - Phase One: TARF Training workshop
    - Common knowledge base of TARF by all major participants in process
    - Theory and practice of TARF
  - Phase Two: Co-operative effort to
    - Establish data bases
    - Build models to analyze and forecast taxes
    - Continue formal workshop training and informal OJT
    - Design organizational arrangements

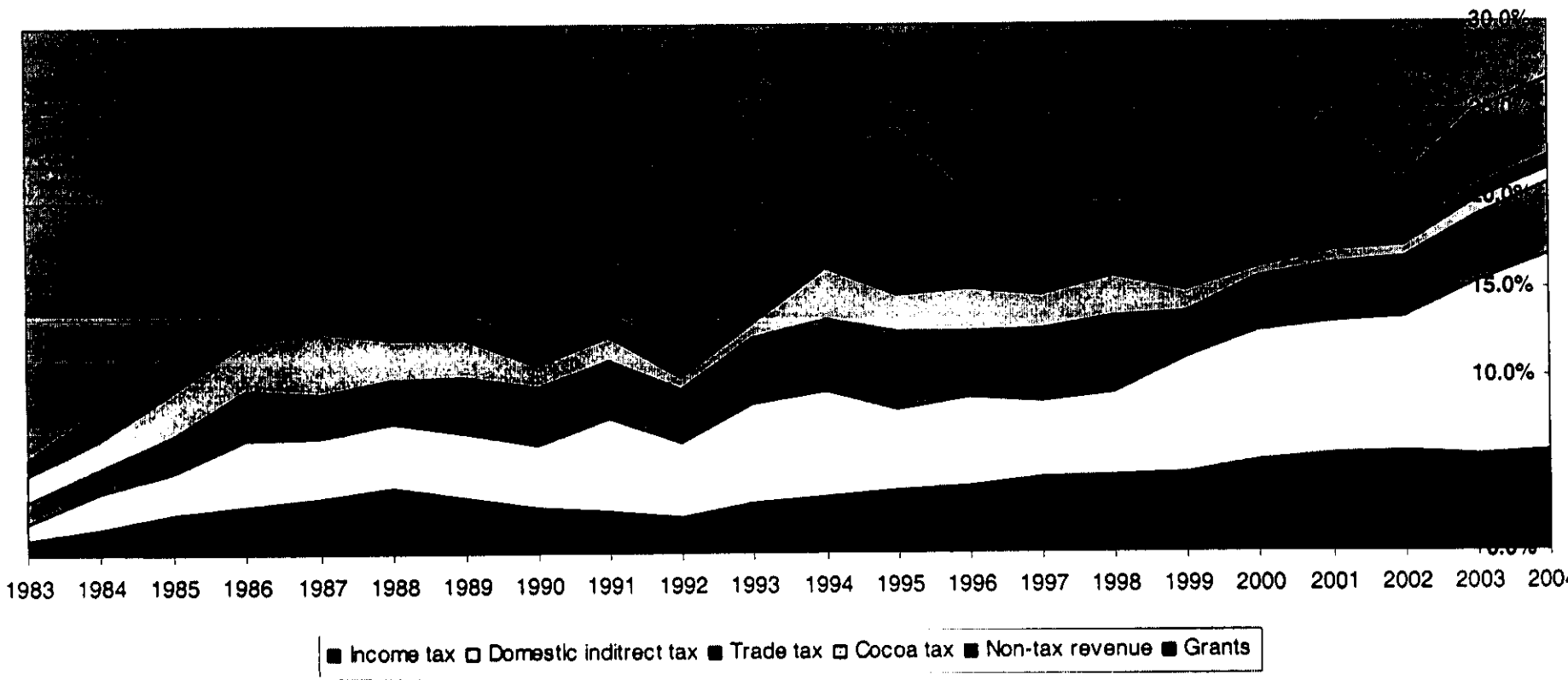
Capacity Building Steps

- Initial training program for representatives of all organization involved in TARF
- Build data systems and models
  - Using existing revenue data by tax type: all revenue agencies
  - Using existing computer based tax administration data bases: CEPS and VATS
  - Conducting sample surveys where missing data to create new data bases: IRS
- On-going training – courses at Duke and OJT
- Organizational and systems design and implementation of data systems and models

Overview of revenues

- **Revenues have ratcheted up at beginning of every decade:**
  - **1983-86: revenues+grants: 6% to 15% of GDP**
  - **1992-94: 15% to 20+% of GDP**
  - **2000-03: 20% to 25+% of GDP**
- **Composition of revenues has changed over time:**
  - Non-tax revenues and cocoa tax declined
  - After initial growth, import duty stayed around 3-4% of GDP
  - Domestic excise duty declined from about 2% to <1% of GDP
  - Petroleum taxes increased to peak of 3.9% in 1993-94, declined to 1.7% in 2001, and now >4% in 2003
  - Income tax gradually grown from <2% to >5% of GDP
  - Sales tax/VAT grew gradually to 1.6% of GDP in 1998; VAT in 1999 increased revenues to 3.8% and grown to 5% by 2003
  - Grants have fluctuated around 2% over the years; since 2001 have been high at 3.1% to 6.9%; currently 4.4% of GDP

Revenues as Share of GDP, Ghana, 1983-2004



TAX REVENUE STATUS AND TRENDS

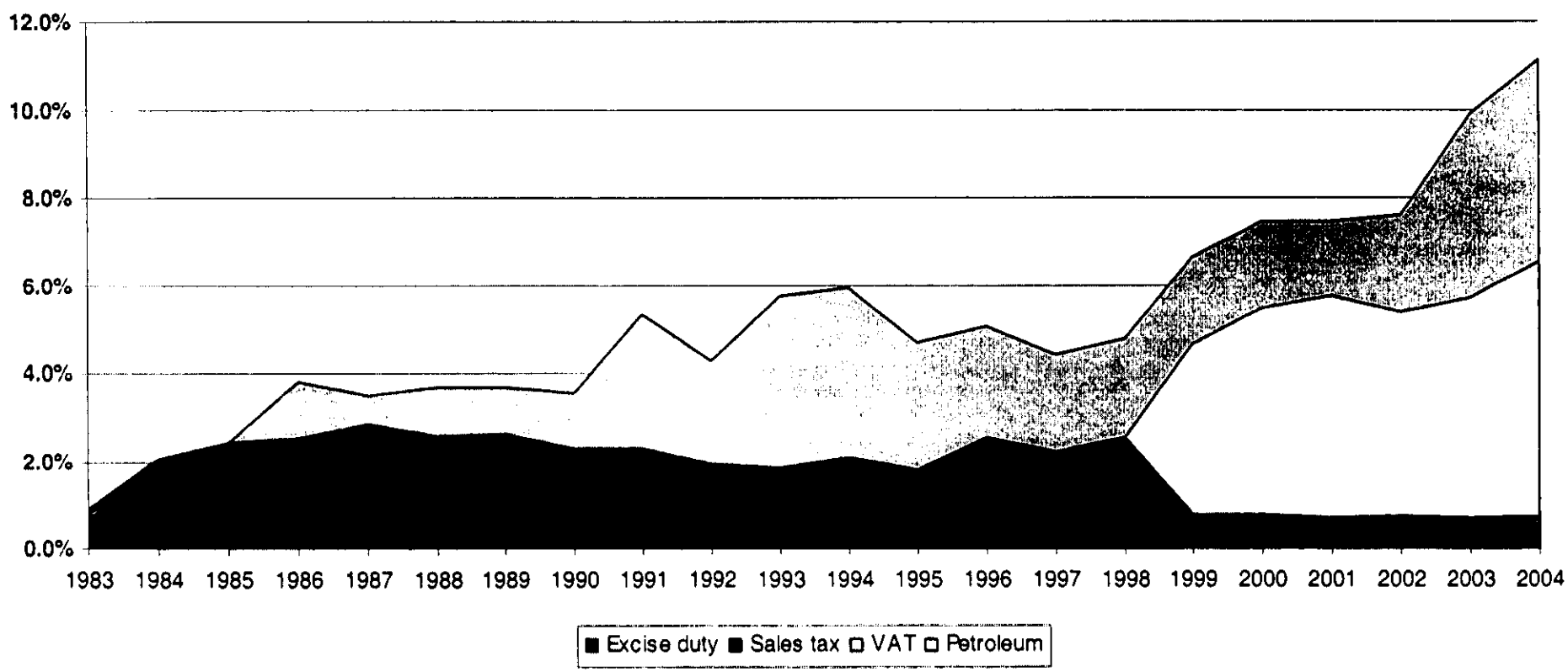
Revenues as a share of GDP, 1999 - 2004

	1999	2000	2001	2002	2003	2004
				Prov	*Proj*	*Proj*
A. Tax Revenue	**14.9%**	**16.3%**	**17.2%**	**17.4%**	**20.0%**	**21.7%**
1. Income & Property	**4.5%**	**5.2%**	**5.6%**	**5.7%**	**5.5%**	**5.6%**
PAYE	1.5%	1.8%	1.8%	1.9%	1.9%	2.0%
Self-Employed	0.3%	0.3%	0.3%	0.3%	0.3%	0.4%
Companies	2.2%	2.6%	2.5%	2.4%	2.3%	2.5%
Others	0.4%	0.6%	1.0%	1.1%	0.9%	0.8%
2. Domestic Goods & Service	**6.6%**	**7.4%**	**7.5%**	**7.6%**	**9.9%**	**11.1%**
Excise Duty	0.8%	0.8%	0.7%	0.7%	0.7%	0.7%
Sales Tax						
VAT total (net of refunds)	3.8%	4.7%	5.1%	4.7%	5.0%	5.8%
Domestic VAT	1.6%	1.4%	1.3%	1.5%	1.6%	1.9%
Import VAT	2.3%	3.3%	3.8%	3.3%	3.6%	4.1%
VAT Refunds			0.1%	0.1%	0.2%	0.2%
Petroleum Tax	2.0%	2.0%	1.7%	2.2%	4.2%	4.6%
3. International Trade	**3.8%**	**3.6%**	**4.1%**	**4.1%**	**4.6%**	**4.9%**
Imports[1]	2.6%	3.0%	3.3%	3.4%	3.7%	4.1%
Export - Cocoa	1.2%	0.7%	0.8%	0.7%	1.0%	0.9%
B. Non-Tax Revenue	**1.8%**	**2.6%**	**0.9%**	**0.5%**	**0.6%**	**0.7%**
Tax + Non-Tax Revenue	**16.7%**	**18.9%**	**18.1%**	**17.9%**	**20.6%**	**22.4%**
C. Grants	**1.7%**	**2.1%**	**6.9%**	**3.1%**	**4.4%**	**4.4%**
TOTAL REVENUE & GRANTS	**18.3%**	**21.0%**	**25.0%**	**21.0%**	**25.0%**	**26.8%**

Note:

1. Tax revenues on imports include more than regular import duties. In 2002, taxes on imports were composed of import duties (80.3%), other levies on imports (ECOWAS, export development, etc) (9.3%), other customs fees and charges (6.6%), export duties

Indirect Domestic Taxes as Share of GDP, Ghana, 1983-2004



Difficulties in revenue forecasting

- Revenue forecasting (or understanding how and why tax revenues change) depends on understanding jointly:
  - **Tax structure** – tax base, rates, exemptions, incentives, etc
  - **Structure of economy** relative to the tax structure
  - **Macroeconomic performance**
  - **Tax administration and compliance capacity**
  - Changes in and interactions between these components over time

Tax revenues as share of GDP in 2002:

Actual revenues, potential tax bases, potential revenues, effective tax base and gaps in tax bases

	Actual Revenue/ GDP	Potential tax base/ GDP (a)	Tax rate (b)	Potential revenue/ GDP	Effective tax base/GDP	Share of potential base not taxed	Reasons for non-taxation: internal or external?
	A	B	C	D = B*C	E = A/C	1-E/B	
Tax Revenue	17.4%						
1. Income & Property	6%	92%					
PAYE	1.9%	20%	13%	2.6%	14.5%	27.3%	Administrative enforcement; exemptions
Self-Employed	0.3%	27.0%	10.0%	2.7%	3.2%	88.3%	Administratively infeasible for many individuals; other types of tax more appropriate to informal sector
Company and other income	3.5%	45%	30%	13.5%	11.7%	74.0%	Administrative enforcement; exemptions and incentives
2. Domestic Goods & Service	7.6%						
Excise Duty	0.7%						
VAT total (net of refunds)	4.7%	90%	12.5%	11%	37%	59%	Administrative enforcement, exemption and feasibility problems
Petroleum Tax	2.2%						
3. International Trade	4.1%						
Import duty	2.7%	47%	10%	4.7%	27.3%	41.9%	Administrative enforcement; exemptions (24%); duty free (18%)
Other levies, fees and charges	0.5%						
Export - Cocoa	0.7%						

(a) 1. Base for income tax is net national income. For PAYE potential base assumes about 1.3 million earning Cd 8 million; and for self employed, it assumes about 4 million earning about Cd 3.3 million

2. Base for VAT is private plus government consumption less public sector wage bill

Tax modeling and TARF

- Tax forecasting models assume
  - **Most of these components are constant** (in a relative sense): Macro- or GDP based models only take account of macro or broad structural changes,

  OR

  - **Many of these components can change**: More comprehensive micro-simulation models rely on detailed information on tax base and tax structure
- Tax analysis generally requires detail of all components – sensitivity to which variables are changing over time is critical (more later)
- All models depend upon good **DATA**; otherwise GIGO

Some macro trends: Sensitivity?

- Over past decade

	Average	Std. dev
– Real GDP	4.7%	1.2%
– Real GDP per capita	1.7%	1.0%
– Inflation (GDP deflator)	28.8%	9.8%

- Implications
  - Real GDP growth is steady, but inflation high and variable
  - Taxes fall on nominal values – inflation is high risk variable
    - GDP deflator for 2003 originally estimated as 18.8% on average for year; now estimate is 27.6% -- a "good" error!!
    - Exchange rate movements also vary to reflect high inflation

Macro variable sensitivity *(contd)*

- Steady growth in GDP per capita and high inflation should lead to
  - high PAYE growth
    - More workers should be earning taxable income
    - Inflation should be resulting major bracket creep: 10% inflation without change in brackets results in about 16% increase in PAYE. PAYE/GDP grew at 15% over past two decades, but has slowed to growth rate of 8% over past decade
    - Slower growth in PAYE revenues can arise from expansion in brackets, failure to enforce tax, exemptions or growth in under-taxed benefits (cars, housing
  - growth in luxury goods bases. (Declines in per capita income and/or worsening of income distribution lowers growth in luxury goods taxes)

Types of model

- Macro or GDP-based models
- Revenue receipts models
- Micro-simulation models

Macro or GDP-based models

- Most commonly used type of model
- Assume tax structure and detailed structure of economy remain constant: used in estimating "base case" or "without discretionary change" revenues
- Revenues are forecast as function of growth in GDP or in major component of GDP that can be used as a proxy for growth in the tax base such as
  - Imports
  - Consumption
  - Components of net income
    - Wages
    - Company profits
    - Interest and dividends

Macro-model structure

Typical macro model:

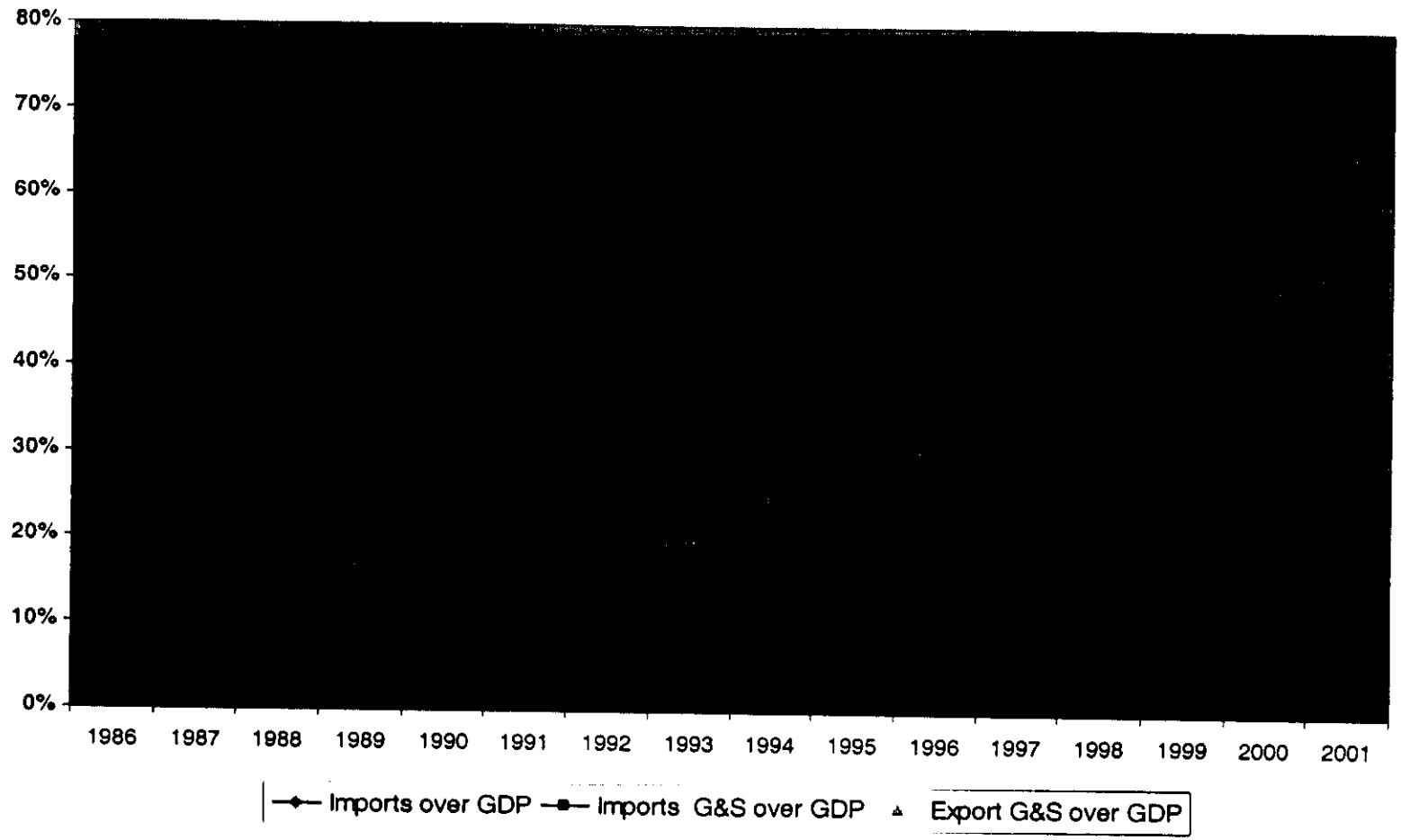
- Growth in tax base = N*Growth in GDP
- N= elasticity of base with respect to GDP
- Growth in tax revenue (without tax rate change) = Growth in tax base (if *ad valorem* tax rate)
- Issue is to estimate "N" and growth in GDP

Log Real GDP		
Variable	Coefficient	t-Statistic
Constant	**5.512**	*15.6*
Log Real Investment	**0.037**	*0.6*
Lagged Log Real Export Values	**0.417**	*14.0*
R-squared	97.2%	
Adjusted R-squared	96.8%	
Durbin-Watson stat	1.61	
F-statistic	209.87	
Data	1986-2001	

1. Real export values (lagged one year) strong predictor of GDP: 10% increase in export value leads to 4.2% increase in GDP

2. Real investment surprisingly weak explanatory variable – need disaggregation of private and public investment

Trade over GDP, Ghana, 1986-2001

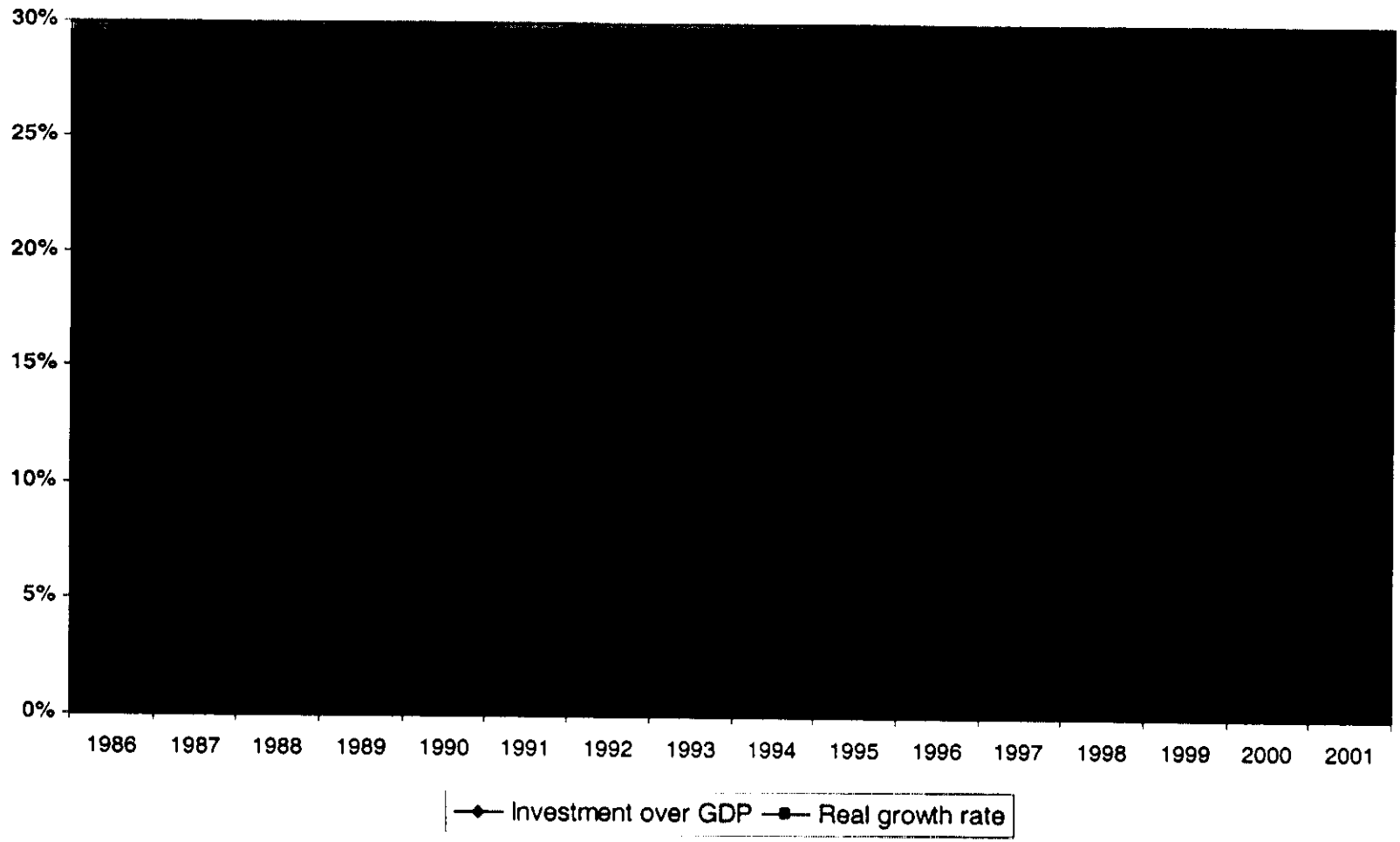


Major structural change in economy: major expansion in trade –

1. increased importance of customs tax collection capacity

2. importance of estimation of border tax collections

Investment and Growth, Ghana, 1986-2001



Weak relationship between investment and growth.
What components of investment are resulting growth?

Log Real Consumption

Variable	Coefficient	t-Statistic	Coefficient	t-Statistic
Constant	**3.559**	1.2	**7.379**	12.3
Log Real GDP	**0.671**	2.0		
Lagged Log Real Export Values			**0.287**	3.6
AR(1)	**0.491**	1.9		
R-squared	59.0%		50.1%	
Adjusted R-squared	52.1%		46.3%	
Durbin-Watson stat	1.66		1.04	
F-statistic	8.62		13.07	
Data	1986-2001			

Growth in nominal consumption = 0.671*Growth in real GDP

+ Expected inflation rate

Log Real Import Values

Variable	Coefficient	t-Statistic	Coefficient	t-Statistic
Constant	**-9.616**	*-10.3*	**-9.829**	*-8.5*
Log Real GDP	**2.314**	*15.2*	**2.260**	*12.5*
Log Real Import Price	**-0.691**	*-4.8*		
Log Real Exch Rate (Cd/F$)			**-0.552**	*-3.6*
R-squared	96.6%		95.3%	
Adjusted R-squared	96.0%		94.5%	
Durbin-Watson stat	2.25		2.19	
F-statistic	182.69		130.76	
Data	1986-2001			

1. Imports are highly income and price responsive; imports are also large share of GDP (about 50%)
2. Import value income elasticity = import quantity income elasticity = 2.3
3. Import value price elasticity = -0.69
4. Import quantity price elasticity = -1.69
5. Import value elasticity wart real exchange rate (RER in Cd/FS) = -0.55, which is close to real import price elasticity (as excludes effects of changes in world prices.)

Forecasting imports

- Import value = (Import quantity)
  *[(world price in F$/unit)*Exch.Rate(D$/FS)]
  = (Import quantity)*(Import price)

  Derived from National Accounts data

- Import value = [(Import quantity)*(world price in F$/unit)]
  *[ER(D$/FS)]
  = [(Import value in F$/unit)] *[Exch.Rate(D$/FS)]

  Derived from Trade and Balance of Payments data

Generally easier to predict world prices of major imports in foreign currency and separately predict exchange rate than to predict real import price for currently available information. Import price index data is typically one or two years old. Foreign currency value of imports, world prices in foreign currency and exchange rates are typically know more currently.

Revenue Receipts Model

- Short-run month-to-month revenue receipts
- Important for predicting and monitoring monthly collections
- Model combines
  - macro growth estimates and
  - Seasonal/monthly patterns of collection in previous year
- Growth factor = Weighted average of
  - Collections YTD/Collections in previous year
  - Macro growth factor for remainder of year
  - Weights are share of months YTD and remainder of year

The Receipts Models

- Models of monthly receipts
  - CEPS
    - All direct responsibility and agency collections
  - VATS
    - Domestic and Import VAT (overlap with CEPS)
  - IRS
    - Major components of income tax (PAYE, self-employed, company and other types)

[illegible]	[illegible]
- IMPORT DUTIES	1,244,371,700,460
- SPECIAL TAX	30,026,398,300
- OTHER FEES AND CHARGES	105,693,808,814
- OTHER LEVIES	149,384,232,071
- COCOA	330,032,236,540
- OTHER EXPORT DUTIES	51,008,316,436
- PETROLEUM	1,104,494,434,977
- IMPORT EXCISE	19,311,847,545
- VAT on imports (AGENCIES COLLECTION)	1,682,049,770,880
- DOMESTIC EXCISE	152,776,190,136
- AGENCIES COLLECTION (EX VAT)	148,368,936,716
- ABOLISHED TAXES	4,605,470,841
- TOTAL	5,022,123,343,716

CEPS accounts for revenue collections above
"Import duties" in national revenue statistics include first four items and other export duties

Micro-simulation models

- Micro-simulation models are based on individual taxpayer or transaction records
- Consist of:
  - Detailed data base drawn from actual records
  - Tax calculator
  - Results report
- Essential for TARF for complex tax structures as exist with
  - Customs – complex tariff and exemption structure
  - Personal income tax with increasing marginal tax rates
  - Company tax with different rates, investment incentives, loss carry forwards, etc

Customs Micro-simulation Data

- In all countries commercial trade transactions are managed by customs agencies. Since computerization of the details of these customs transactions, rich data bases now exits for analysis of trade and related taxation.
- CEPS has been using the **ASYCUDA** computer system to support customs administration and capture trade statistics. Starting in last quarter of 2002, CEPS is converting to a more comprehensive system known as **Ghana Customs Management System (GCMS)** that also uses GCNET (Ghana Community Network Services Ltd) to support data transfer with customs agents to allow modern computerized customs clearance procedures and more complete computerized administration.

Types of information on customs data base

- **Commodity type**
  - Harmonized System Commodity Code (**HS Code**)
    - SITC
    - Broad Economic Code (**BEC**)
- Importer/Exporter identification
- Country of origin or destination
- **Values** (cif/fob), currency, exchange rate, quantity, units, price
- **Customs, VAT, excise, and other levy rates**
- **Duty, tax, fees charged/collected/exempted**
- Type of transaction (**Customs Processing Code**) – import, temporary import, into/out of bonded warehouses or free zones, export or re-export, transit, etc and all types of **exemption** or special treatment of any otherwise dutiable transaction
- Other: type of transportation, customs office location, etc

Two micro-simulation models

- Two parallel models have been built for TARF for ASYCUDA and GCMS data bases – eventually first can be phased out.
- Both have similar structure:
  - Access **Database** of raw data of customs transactions selected from Customs records
  - Excel **Tariff** file that contains current tariff schedule for a year and allows specification of new tax rates and growth parameters to forecast new year
  - Excel **Trade HS-CPC Output** that processes selected annual records from data base using specification of tariffs and produces output tables that present current and proposed or forecast imports and revenues.

Key variables in customs data

- **HSC** – Harmonized System Code specifies commodity (HSCODE, SITC, BEC, description) and related duty, tax and levy rates
- **CPC** – Customs Procedure Code specifies the type of transaction (import/export, into and out of bond, etc) and any special treatment (exemptions, incentives, etc)

Output Tables

- Import values and revenues by type of tax and exempt/taxable status
  - by tax rate
  - by BEC
  - by HSCODE
  - by CPC
- Each type of taxable is calculated both for current values and for proposed/projected tariff schedule and economic growth and import price changes

Income Tax Models

- **Two models**
  - PAYE tax model
  - Company tax model
- **Data bases established**
  - PAYE for non Public Service (sample survey)
  - PAYE records for Public Service (computer based)
  - Company data (sample survey)
  - Self-employed business data (sample survey)

TAX ADMINISTRATION AND REVENUE FORECASTING

- FIELD DATA COLLECTION

- PAYE MICROSIMULATION MODEL

Overview

- **COVERAGE OF DATA COLLECTION**
- **SAMPLING METHODOLOGY**
- **DATA COLLECTION PROCESS**
- **RESULTS AND OBSERVATIONS**
- **PAYE MICROSIMULATION MODEL**

COVERAGE OF FIELD DATA COLLECTION

- COMPANIES
- SELF-EMPLOYED
- INDIVIDUALS (PAYE)

SAMPLING METHODOLOGY

- **FIRST STAGE SAMPLING**

  - **DEFINITION OF ZONES AS USED IN THE GHANA LIVING STANDARD SURVEY (GLSS)**

  - GHANA AGRO-ECOLOGICAL ZONES

GHANA AGRO-ECOLOGICAL ZONES

COASTAL ZONE	GREATER ACCRA REGION
FOREST ZONE	ASHANTI REGION
SAVANNAH ZONE	NORTHERN, UPPER WEST AND UPPER EAST REGIONS
COASTAL-FOREST ZONE	WESTERN AND CENTRAL REGIONS
FOREST-SAVANNAH ZONE	BRONG-AHAFO REGION
COASTAL-FOREST-SAVANNAH ZONE	EASTERN AND VOLTA REGIONS

PAYE TAXPAYER DISTRIBUTION

AGRO-ECOLOGICAL ZONE	REGION	EST.NO. OF TAXPAYERS	%
COASTAL (79.3)	LTO	913,087	57.5
	GREATER ACCRA	346,746	21.8
FOREST (10.2)	ASHANTI	161,815	10.2
SAVANNAH (0.7)	NORTHERN	6,301	0.4
	UPPER-EAST	2,640	0.2
	UPPER-WEST	1,274	0.1
MIXED (9.8)	WESTERN	113,853	7.2
	EASTERN	15,058	0.9
	CENTRAL	14,069	0.9
	BRONG-AHAFO	7,881	0.5
	VOLTA	4,838	0.3
TOTAL		1,587,562	100.0

SECOND STAGE SAMPLING - PURPOSIVE

TAXPAYER DISTRIBUTION BY REGION – EXCLUDING LTO

AGRO-ECOLOGICAL ZONE	REGION	EST. NO. OF TAXPAYERS	%
COASTAL (51.4)	**GREATER ACCRA**	**346,746**	51.4
FOREST (24.0)	**ASHANTI**	**161,815**	24.0
SAVANNAH (1.5)	**NORTHERN**	**6,301**	0.9
	UPPER-EAST	**2,640**	0.4
	UPPER-WEST	**1,274**	0.2
MIXED (23.1)	**WESTERN**	**113,853**	16.9
	EASTERN	**15,058**	2.2
	CENTRAL	**14,069**	2.1
	BRONG-AHAFO	**7,881**	1.2
	VOLTA	**4,838**	0.7
TOTAL		**674,475**	100.0

SELECTED DISTRICT OFFICES - REPRESENTING URBAN AND SEMI-URBAN AREAS

ZONE	REGION	DISTRICT OFFICE	EST. NO. OF TAXPAYERS	%
COASTAL (51.2%)	GREATER ACCRA	ADABRAKA	**24,344**	**5.5**
		MAKOLA	**11,793**	**2.7**
		TEMA	**64,666**	**14.6**
		OSU	**65,117**	**14.7**
		LEGON	**53,530**	**12.1**
		TESHIE/NUNGUA	**7,588**	**1.7**
FOREST (24.3%)		OBUASI	**107,966**	**24.3**
SAVANNAH (1.4%)		TAMALE	**6,226**	**1.4**
MIXED (23.1)	WESTERN	TARKWA	**64,201**	**14.5**
		SEFWI-WIAWSO	**12,093**	**2.7**
	EASTERN	KOFORIDUA	**6,934**	**1.6**
		ASAMANKESE	**4,718**	**1.1**
	CENTRAL	CAPE COAST	**6,991**	**1.6**
	BRONG-AHAFO	SUNYANI	**4,073**	**0.9**
	VOLTA	HO	**3,429**	**0.8**
TOTAL			**443,669**	**100.0**

THIRD STAGE SAMPLING – RANDOM SELECTION OF EMPLOYEES

DISTRICT OFFICE	EST. NO. OF TAXPAYERS	NO. OF SAMPLES	%	EST. SAMPLE WT
LTO - PAYE	**913,087**	**800**	**24.3**	**1,141**
ADABRAKA	**24,344**	**110**	**3.3**	**339**
MAKOLA	**11,793**	**106**	**3.2**	**169**
TEMA	**64,666**	**292**	**8.9**	**339**
OSU	**65,117**	**294**	**8.9**	**339**
LEGON	**53,530**	**241**	**7.3**	**339**
TESHIE/NUNGUA	**7,588**	**137**	**4.2**	**85**
OBUASI	**107,966**	**243**	**7.4**	**665**
TAMALE	**6,226**	**112**	**3.4**	**91**

CONT'D.

TARKWA	**64,201**	**289**	**8.8**	**337**
SEFWI-WIAWSO	**12,093**	**136**	**4.2**	**135**
KOFORIDUA	**6,934**	**125**	**3.8**	**84**
ASAMANKESE	**4,718**	**106**	**3.2**	**67**
CAPE COAST	**6,991**	**126**	**3.8**	**84**
SUNYANI	**4,073**	**92**	**2.8**	**67**
HO	**3,429**	**77**	**2.4**	**67**
TOTAL		**3,287**	**100.0**	

MAJOR DATA ITEMS COLLECTED

- **PERSONAL INFORMATION**

  - NAME, GENDER, AGE, MARITAL STATUS, NO. OF CHILDREN, NUMBER OF AGED DEPENDANTS, PHYSICAL DISABILITY, ETC

- **ANNUAL ASSESSABLE INCOME**

  - WAGES & SALARIES, BENEFITS IN KIND, ETC

- **PERSONAL RELIEFS/DEDUCTIONS**

- **TAX PAID**

MAJOR DATA ITEMS COLLECTED ON COMPANIES

- **TAXPAYER IDENTIFICATION**

  - FILE NUMBER, TIN, NAME OF COMPANY, INDUSTRIAL SECTOR, YEAR OF INCORPORATION, ETC

- **PROFIT/LOSS STATEMENT & BALANCE SHEET**

- **COMPUTATION OF INCOME TAX**

- **COMPUTATION OF INCOME TAXED AT DIFFERENT RATES**

- **CAPITAL ALLOWANCE & LOSS CARRIED FORWARD**

RESULTS

	TOTAL SAMPLE SIZE	TOTAL COVERED	% COVERED
LTO - COMPANIES	507	456	89.9
NON-LTO COMPANIES	963	366	38.0
SELF-EMPLOYED	1,497	350	23.4
PAYE	3,287	1578	48.0

OBSERVATIONS

- REGULAR UPDATE OF DATABASE.
- ABSENCE OF FINANCIAL STATEMENTS AND ASSESSMENTS ON SOME FILES.
- LATE EXAMINATION OF FILES.
- FILES PER OPERATIONAL STAFF VERY HIGH.

PAYE MICROSIMULATION MODEL

- **CALCULATES INDIVIDUAL TAX LIABILITY**

- **USES DATA ON INDIVIDUAL TAXPAYERS TO FORECAST REVENUES**

- **ASSESSES THE EFFECTS OF A VARIETY OF POLICY OPTIONS**

COMPONENTS OF THE MODEL

- **DATABASE**
- **PARAMETERS**
- **TAX CALCULATOR**
- **TYPICAL TAXPAYER MODEL**
- **AGGREGATE MODEL**
- **DISTRIBUTIONAL IMPACT TABLES**

VAT data and models

- VAT has a relatively simple structure: generally applies 12.5% tax to consumption expenditures. GDP-based models are useful in forecasting revenues
- Some complexities arise out of
  - Division of collections between import (by CEPS) and domestic traders by (VATS) – need for separate estimates and understand interactions between border and domestic collections
  - Net revenue flows affect by three working capital accounts
    - Debtors, receivables or arrears of positive tax outstanding
    - Creditors of unpaid refunds
    - Creditors of VAT credits carried forward

VAT Micro-database

- Micro-database is being built from various VAT returns and other documents.
- Data is currently available for 1999-2001. Data for 2002 is being finalized
- Data is generally monthly and includes
  - Industrial sector (ISIC), region, time period
  - Output VAT, Domestic Input VAT, Import Input VAT
  - VAT liability and credits generated and carried forward
  - Additional assessments and adjustments
  - Tax refunds claimed and paid

Decomposing VAT

VAT collections

	VAT = Dom. VAT	+ Imp VAT
1999	33.1%	66.7%
2000	28.4%	71.6%
2001	28.5%	71.5%

	δ	γ
1999	43.8%	56.8%
2000	39.0%	82.4%
2001	41.3%	59.8%

Final VAT

	VAT = Output VAT $(1-\delta)$	+ Imp VAT$(1-\gamma)$
1999	70.3%	29.7%
2000	87.4%	22.6%
2001	71.2%	28.8%

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Understanding Import VAT composition

- VAT is ultimately a tax on consumption and can be estimated as combined amount
- In short-run changes in import share in economy and composition of imports will vary total VAT
  - CEPS may be more effective at collecting VAT on imports of small traders than VATS is on enforcing domestic VAT collection from same small traders
  - Change in composition of imports can result in more or less final VAT collections. Important to adjust net VAT collections for import VAT that will be deducted. Ultimately TIN will allow linkage of customs transactions to domestic traders VAT accounts to accurately know which types of imports are deducted with what probability. Currently can use BEC code to guesstimate probabilities of different categories of imports being VAT deductible. Checked whether predicted actual total import VAT deductions claimed.

Estimates of deductibility of Import VAT in different BECs

BEC	Description	Classification	Share of Import VAT deductible Low	High
100	Food and beverages			
110	Food and beverages, primary			
111	Primary food and beverages, mainly for industry	Intermediate	65%	75%
112	Primary food and beverages, mainly for household consumption	Consumption	5%	15%
120	Food and beverages, Processed			
121	Processed food and beverages, mainly for industry	Intermediate	80%	90%
122	Processed food and beverages, mainly for household consumption	Consumption	10%	20%
200	Industrial supplies n.e.s.	Top Level		
210	Primary Industrial supplies n.e.s.	Intermediate	80%	90%
220	ProcessedIndustrial supplies n.e.s.	Intermediate	80%	90%
300	Fuels and Lubricants	Top Level		
310	Fuels and Lubricants, primary	Intermediate	15%	25%
320	Fuels and Lubricants, processed	Intermediate		
321	Fuels and Lubricants, motor spirit	Other	5%	15%
322	Fuels and Lubricants, other	Intermediate	40%	50%
400	Capital Goods (except transport) and parts and accessories			
410	Capital Goods (except transport)	Capital	40%	50%
420	Capital Goods - parts and accessories	Intermediate	40%	50%
500	Transport Equipemnt and parts and accessories thereof			
510	Passenger cars	Passenger Cars	5%	10%
520	Other transport			
521	Industrial transport	Capital	60%	70%
522	Non-industrial transport	Consumption	10%	20%
530	Transport Equipment - parts and accessories	Intermediate	30%	50%
600	Consumer goods n.e.s.			
610	Durable consumer goods	Consumption	10%	15%
620	Semi-durable consumer goods	Consumption	5%	10%
630	Non-durable consumer goods	Consumption	0%	5%
700	Goods n.e.s.	Other	10%	20%

VAT arrears, credit carry forwards and outstanding refunds

- Forecasting the revenues available from VAT depends not only on predicting value of new VAT liabilities and collections that will be generated out of new economic activity, but also on administrative actions take to collect arrears or settle credits and refunds: new tax accruals may not turn into new tax flows.
- Given VAT started with a zero balance sheet in 1999, it possible to build up set of capital accounts for VAT from flows of new tax liabilities, re-assessments, penalties and interest charges, new credits generated and absorbed, refund claims and payments. Accounts for 2001 presented next.

Domestic VAT stock and flow accounts for 2001

	Flows	Stocks	Percent of Net VAT
	Cedi millions		
New net output taxes	802,925		
New credits	(275,361)		
Accrued VAT from 2001 activity	**527,564**		
Reassessments, adjustments, penalties and interest	33,659		
Gross accrued VAT	**561,223**		
Domestic VAT collections	**574,042**		
Refunds paid	(37,972)		
Net VAT revenues	**536,070**		
Refund opening balance		12,993	
Refund claims	44,931		
Refund payments	(37,972)		
Refund closing balance		**19,952**	*3.7%*
VAT credit carryforward opening balance		87,999	
New Credits	275,361		
Credits absorbed and refunds claimed	(264,931)		
VAT credit carryforward closing balance		**98,428**	*18.4%*
VAT arrears opening balance		246,307	
New taxes and reasssessments, etc	836,583		
VAT collections and credits absorbed	(794,042)		
VAT arrears closing balance		**288,849**	*53.9%*
VAT arrears net of credit carryforward		**190,421**	*35.5%*

VAT arrears, credit carry forwards and outstanding refunds

- Importance of decomposing stocks and flows of VAT, credits and refunds
  - Different taxpayers require different administrative actions to resolve outstanding balance
  - Under VAT credits carried forward can be absorbed by future taxes, but arrears cannot be offset by future credits
  - Need mechanisms to offset credits and refund claims against all types of tax arrears

TAX POLICY ANALYSIS and REVENUE FORECASTING

Establishing A Tax Policy Unit: An Exercise In Capacity Building

The Present Set Up

- The Policy Analysis Division (PAD) in the MOF currently responsible for analyzing existing tax policies, initiating new policies and revenue enhancing measures.
- New proposals/demands could originate from revenue agencies, Minister of Finance, people's representatives, and other stakeholders.
- In practice, however, very limited policy analysis being done in PAD or elsewhere due to lack of organized capacity. Most proposals forwarded to the revenue agencies for analysis.

Policy Analysis Division

- The main role of PAD is **coordination** among the revenue agencies and RAGB; usually done through annual meetings in December/January just before finalizing budget proposals.
- No sector follow up is done – whether revenue yield from a specific sector of economy consistent with its growth and the prevailing economic situation, and reasons for revenue shortfall, if any.
- Presently monitoring takes precedence over forecasting as realization of revenue targets is of paramount importance: but no capacity to reconcile revenue receipts with economic activity and tax administration collections.

Role of Policy Analysis Division

- Revenue forecasts done by revenue agencies: only their assumptions and results scrutinized by PAD.
- While PAD has some capacity to evaluate revenue forecasts done by agencies, practically no capacity for independent forecasting.
- On the expenditure side, PAD involved in reconciliation of expenditure figures from the budget department, the Bank of Ghana and the Controller and Auditor General.

Role of PAD *(contd.)*

- PAD also responsible for aid and debt management, and serves as interface with IMF and other donors.
- The unit does not have its own databases and draws upon the data maintained in other parts of the Ministry.
- ***To summarize;*** presently, the division lacks both the manpower and the skills to do what it is expected to do. As a result, new policy measures often launched without adequate analysis and then have to be withdrawn subsequently.

The Revenue Agencies Governing Board (RAGB)

- Currently, the main task performed by RAGB is of monitoring revenues; a common reporting format being used for this purpose (suggested by IMF). However, lack of uniformity of data and reporting from revenue agencies a major bottleneck.
- Cost of collection monitored only for IRS; CEPS and VAT in the process of establishing a system.
- Building of capacity for revenue forecasting underway; more manpower and training needed, however.

The Revenue Agencies

- Revenue agencies' main focus on meeting revenue targets, monitoring performance of field units, and looking for revenue enhancing measures.
- Sector monitoring (revenue performance by sector) done on a limited basis due to lack of manpower and capacity.
- Tax Expenditure analysis not being done but tax incidence analysis sometimes attempted by revenue agencies on selective basis (e.g. a study of distributional impact of VAT done with the help of CEPA but the study was not thorough).

Revenue Agencies and Forecasting

- Currently not much done in way of revenue forecasting (VAT uses monthly Receipts model with suitable adjustment for growth and inflation). VATS makes some use of its micro-database; CEPS makes little use of its micro-data base. No reconciliation of computer records with collection accounts
- Each agency has its own Research Planning and Monitoring Unit (RPUM) to perform these tasks. Manpower available and recently measures adopted to improve capacity, but a more sustained effort may be required.
- Lack of systematic data a main bottleneck for the IRS in the absence of computerization.

Towards a Tax Policy Unit (TPU)

- A tax policy unit needed at the MOF level with adequate manpower and capacity to:
  - Assist in policy formulation and decision making process (internal review, examination of unsolicited proposals, consultation with stakeholders, assessing revenue growth potential and stability, administrative/ compliance costs, legal drafting etc.)
  - Analyze impact of tax and non-tax policies (trade liberalization, deregulation, interest rate change) in terms of revenues, efficiency, incidence
  - Conduct sector and economic studies, examine implications of foreign tax agreements

Towards a TPU *(contd.)*

- TPU to …
  - Forecast revenues (maintenance of database, development of models, forecasting revenues both short-term and medium term, tax expenditure analysis)
  - Support the budget formulation and implementation process (by providing current year and medium term revenue forecasts and revised estimates during the budget cycle)
  - Monitor performance of revenue agencies (collection against targets including seasonal targets by tax types, scrutiny of tax arrears, provide leadership in monitoring and forecasting tax collections)

A Three-Tier Structure

- Necessary to separate tax policy work from tax administration and implementation.
- Tax policy work best assigned to TPU located within the MOF while tax administration to be RAGB's responsibility. TPU needs to weigh efficiency and equity trade-offs in difference types of tax and non-tax revenue.
- For TPU to be effective, however, a close link with RAGB and the three tax agencies crucial so that policies formulated and revenue forecasts at the Ministry level are practical and realistic.

TPU in MOF With Supporting Units in RAGB and Revenue Agencies

- The Policy Analysis Division (PAD) may be suitably strengthened in terms of manpower, skills and equipment to perform the functions of TPU
- RAGB to have its own full-fledged Research Planning and Monitoring Unit (RPMU) for necessary technical support for monitoring revenue performance of tax agencies and evaluating the revenue potential
- The RPMU in each revenue agency should be better equipped through training and provision of additional facilities.

Close Coordination Between TPU, RAGB and Tax Agencies

- Coordination between TPU, RAGB and revenue agencies essential both in terms of policy formulation and revenue forecasting.
  - Agencies critical in maintain quality and supply of data
  - Need agreement and ownership of revenue forecasts by all agencies
- An empowered committee comprising of representatives of the TPU, RAGB and revenue agencies to meet on a regular basis and consider various policy proposals, revenue enhancing measures and their practical implication.
- A revenue forecasting coordination committee with representatives from TPU, RAGB and tax agencies to facilitate data sharing and division of labor in terms of the revenue forecasting exercise.

The Process of Developing TPU and Support Services

- The creation of a tax policy unit requires adequate preparation through a multi-pronged approach.
- Necessary to adopt a suitable personnel policy of remuneration, and career development for tax policy officers
- Human resource development essential through specialized training in economics, accounting, tax laws, tax administration and procedures, data analysis and forecasting models

Process of Developing TPU *(contd.)*

- Important to establish a management information system with appropriate tax monitoring systems and computer network for creating a database and installing modeling
- Joint training programs for personnel in TPU as well as personnel in RPMUs at the RAGB and tax agency levels would facilitate both performance of individual units and coordination among them.

Findings and Recommendations

Tax Policy Unit and related RPM units

- Develop capacity for TARF
- Demand for good data depends upon effective TARF capacity
- **Policy unit in MoF**
  - Focus on tax policy – efficiency, equity and cost-effectiveness of all revenue measures – trade-offs in revenue policy
  - Co-ordinate consistency with general macroeconomic management and budget policy and implementation
- Team effort involving all revenue agencies, RAGB, Ministry of Finance, BoG and GSS
  - Research Planning and Monitoring units required in all revenue agencies: focus on collection performance and forecasting of own revenues
  - RAGB unit to monitor and analyze data from all agencies and oversee collection performances with focus on administrative measures to improve performance

Findings and Recommendations

- More effective use of computerized data in CEPS and VATS in tax administration:
  - Integration of computer systems into administrative processes – currently parallel paper and computer systems such that actual collections may not reconcile with computer records
  - Computer systems in VATS and CEPS not being fully used to monitor performance or analyze tax performance and structure

Findings and Recommendations

Need for improved data management and eventual computerization in IRS

- Improved tax forms, especially for company tax
  - Design should be consistent with future computerized income tax system
- Enforcement of accounts presentation by companies and capable self-employed
  - Develop accounting profession to support tax system, especially in preparation of accounts and returns
- Complete employee record reporting by employers
- Improved file management and reporting of tax status of tax filers (active, dormant, etc)
  - Essential that this be implemented in conjunction with implementation of TIN system to establish clean records of taxpayer identities and tax accounts – key to computerization of income tax

Findings and Recommendations

- **Improvements in PAYE policy**
  - Simplification of personal deductions, remove requirements for certification of complex personal situations and switch to tax credits to make personal allowances more progressive and lower tax cost. Result –
    - PAYE should be a final tax for most employees
    - Lower administration and compliance costs
  - Complete reporting of all employee records by employers plus more frequent field audits of combined PAYE and company records to ensure reconciliation of PAYE returns.
  - Review of tax treatment of employee benefits to reduce subsidies to high income beneficiaries of vehicle, accommodation, low interest rate loan and other benefits

Findings and Recommendations

- Improved tracking of VATS arrears, credits and refunds
  - VATS needs to maintain accounts of arrears, credit carry forwards, and outstanding refunds on monthly basis
  - Need for legal provision to offset arrears with credits and/or refunds
- Improvements in CEPS data and collection management
  - Ensure explicit records on all types of revenues, refunds and credits so that computer records can be reconciled with actual tax revenue receipts
  - Tax expenditure records should be explicitly maintained in GCMS data system and reports for all exemptions

Findings and Recommendations

- Reconciliation of all computer data base collection records with actual collections on regular basis to ensure validity of computer records for monitoring, analysis and forecasting purposes
  - This would be a routine result once computer systems are used as the primary tax accounting system within a revenue agency (not a secondary parallel system)

Next Steps

- Setting up models in
  - TPU in Ministry of Finance
  - RAGB Secretariat
  - Research, Planning and Monitoring Units in each revenue agency
- Ongoing work to refine models and establishing data updating procedures
- Establishing revenue monitoring, analysis and reconciliation procedures
- Further assistance will be provided on this starting next week