

Portfolio Optimisation for the Industrial Development Corporation (IDC)

A Dissertation Presented

by

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DECLARATION

This dissertation is a presentation of my original research work. Wherever contributions of others are concerned, every effort is made to specify this, evidently and with due mention to the original sources.

The research was completed with the supervision of Professor Christopher Malikane at WITS Business School, South Africa.

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ABSTRACT

PORTFOLIO OPTIMISATION FOR THE INDUSTRIAL DEVELOPMENT CORPORATION (IDC)

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CHARL DIRK DU PLESSIS

Abstract:

The Industrial Development Corporation (IDC) is South Africa's largest development financial institution with a stated objective of generating sustainable economic growth across Africa. Additionally, the IDC is also mandated by the South African government to assist in key national development policies. In order to achieve these goals, the IDC seeks to maximise development returns within an acceptable risk portfolio.

Using historical data, sector development scorecard analysis and results, and portfolio investment theory, this dissertation examines the investment portfolio weighting to determine if the IDC is positioned to achieve its stated and mandated objectives.

The guiding question of this thesis is whether or not the IDC is optimising its capital allocation, and I further seek to identify the sectors in which the IDC should invest in more and the ones the IDC should invest in less in order to achieve maximum development returns.

In order to attain an optimal portfolio, the IDC should strive for portfolio selection methodologies as outlined in Markowitz's Mean-Variance Theory. One of the key benefits of driving this methodology is, depending on the strategic objective, the achievement of an optimised portfolio with predefined constraints. Furthermore the methodology establishes an analytical approach to maximising the strategic objectives.

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Chapter 1

Introduction

1.1 Background to Study

The fundamental goal of any investor is to optimise their allocation of capital in their investment portfolio, which would yield the required return, given the associated risks. Capital budgeting is a well-developed field which has been described in many texts for instance Brealey, et al. (2008) and Luenberger (1998).

The vision of the Industrial Development Corporation (IDC) is:

“To be the primary driving force of commercially sustainable industrial development and innovation to the benefit of South Africa and the rest of the African continent.” Industrial Development Corporation (IDC) (2013).

The mission statement of the IDC reads:

“The IDC is a self-financing national development finance institution whose primary objectives are to contribute to the generation of balanced, sustainable economic growth in Africa and to the economic empowerment of the South African population, thereby promoting the economic prosperity of all citizens. The IDC achieves this by promoting entrepreneurship through the building of competitive industries and enterprises based on sound business principles.” Industrial Development Corporation (IDC) (2013).

Although the IDC strives for a balanced and sustainable economic growth within Africa, fundamental arguments can be made that the allocation of capital within their portfolio of investments is not optimised within the context of their vision and mission.

The question of whether the IDC's portfolio is optimised in order to achieve the goals as set out in the vision and mission is the focus of this thesis.

1.2 Research Questions

The IDC strives for:

- (i) Generation of balanced and sustainable economic growth within Africa;
- (ii) Economic empowerment of the South African population.

Given the current state of the economy, is the IDC optimising the capital allocation? If not, questions should be raised.

1.3 Significance of the Study

The study is aimed at understanding the key focus areas of the South African government, as positioned through their respective policies, and how the IDC utilises its capital in order to achieve these strategic objectives. The significance of the study is:

- i. Determining an objective approach to understanding the implementation of capital investment decisions and comparing those to an optimised portfolio, given the key focus areas of the government;
- ii. Supporting the adaption of currently utilised methodologies and deriving changes for prospective approaches to investment decisions within development financial institutions (DFI), of which the IDC is among the largest in Africa;
- iii. Supporting the objective of the sustainable economic growth framework by contrasting the objectives of the IDC with the actual capital investment decisions made;

- iv. Introducing an analytical framework and modelling methodology for portfolio optimisation, where the key drivers are non-conventional sustainable economic development and economic empowerment.
- v. Identifying means to maximise utility of capital investments to drive effective delivery of strategic objectives as outlined in the vision and mission of the IDC.

1.4 Scope of the Study

This study will be limited to the Republic of South Africa (RSA) and the IDC as it is the primary DFI within the country.

The IDC was founded in 1940 with the primary aim of developing RSA through the Industrial Development Corporation Act No. 22 of 1940 and was principally focused on large investments which would influence industry within RSA. In addition, the IDC also tackles market failures through both capital and non-capital support, which may not otherwise be presented. The IDC aims to build strategic partnerships with the private sector companies to drive collaboration between them.

The IDC endeavours to maximise development returns within an acceptable risk portfolio. The effective result of driving development returns over profits is the ability to assume a higher risk position than commercial financing institutions. This capacity which the IDC creates, through their respective investments, drives industry development of sectors as well as new entrepreneurs into the economy. The IDC aims to develop sectors and entrepreneurs through:

- Diversifying the economy by supporting a range of sectors;
- Encouraging the introduction and development of new industries and products;

- Developing internationally competitive companies;
- Supporting the establishment of green-fields developments;
- Supporting expansions of existing businesses;
- Facilitating the entry of new entrepreneurs and supporting their development;
- Supporting the growth and development of small and medium businesses into competitive players; and
- Encouraging regional development by supporting companies with regional comparative advantages.

Given the significance of the study as outlined above, the study will focus on the key strategic industries and initiatives as identified by the IDC's only stakeholder, the government of the Republic of South Africa. The key objectives of the IDC are outlined in the government policies, namely:

- The New Growth Path;
- National Development Plan 2030;
- Industrial Policy Action Plan 2014 to 2016; and
- IDC strategic objectives as identified by the executives of the IDC.

This study will be limited to understanding the strategic objectives and then developing an optimised portfolio which aims to achieve these stated objectives.

Chapter 2

Literature Review

2.1 Role of Development Financial Institutions (DFI) in Financing Economic Development

Considering the statement of Dickman (1973) whereby he states that:

“... institutions canalising savings and government funds functions like facilitating mechanisms through which the burden of waiting and risk bearing is shifted to those most able to bear it, and which facilitate the transfer of capital from those who possessed it to those who could employ it more profitably.”

In the context of the IDC in its capacity as a DFI, it facilitates the transfer of capital from the government to those who could employ it more effectively in achieving government policies and strategic objectives.

Dalberg (2010) defines DFI's as:

“... government-controlled institutions that invest in sustainable private sector projects with the twofold objective of spurring development in developing countries while themselves remaining financially viable” (Dalberg, 2010, p. vi)

The primary contribution of DFI's to development arises primarily in DFI's providing finance to those segments of the private sector that are underserved (generally in developing markets), thereby increasing employment opportunities, income, tax revenue and product availability. A DFI assists in improving skill levels of the developing market, residing and facilitates the transfer of technology and knowledge through DFI participation, which is often achieved through management and the

development of the underlying companies. This contributes to the strengthening of local conditions and reducing aid dependency. (Dalberg, 2010, p. 7)

2.2 The New Growth Path

According to Van Aardt, et al. (2011), the main objective of the RSA government, since the first democratically held elections in 1994, was to create a better life for all citizens. The government's main focuses were the distribution of wealth and income, the economic growth rate and unemployment.

And during the period from 1994 to 2009, the government sanctioned three official economic programmes to drive these objectives. The first of these was the Reconstruction and Development Programme (RDP) as expressed in the policy developed by the Department of the Presidency of the Republic of South Africa (1994); the second, the Growth Employment and Redistribution Programme (GEAR) as expressed in the policy developed by the Department of Finance for the Republic of South Africa (2010); and the third was the Accelerated and Shared Growth Initiatives of South Africa (AsgiSA) as expressed in the policy developed by the Department of the Presidency of the Republic of South Africa (2006).

By 2009 the objectives of these programmes failed to reach their targets and Collin Chabane, the Minister in the Presidency for Performance Monitoring and Evaluation, then revealed a fourth programme in November 2010, The New Growth Path (NGP) policy which was published by the Department of Economic Development in the Republic of South Africa (2010). The aim of the NGP was to create five million jobs and reduce the unemployment rate from 25% to 15% over the subsequent 10 years.

The strategy has a series of micro-economic and macro-economic measures which are aimed at assisting South Africa attain its growth targets

The NGP framework is aimed at achieving the targets and objectives through regulatory reforms; building an integrated African economy; and partnerships between government, private sector and the public.

2.3 National Development Plan 2030

The National Development Plan 2030 is a key policy which sets the goals, visions and critical development areas within South Africa. This policy is essentially the framework around which the New Growth Path and Industrial Policy Action Plan is built. According to the South African Government National Planning Commission (2012):

“The National Development Plan is a plan for the country to eliminate poverty and reduce inequality by 2030 through uniting South Africans, unleashing the energies of its citizens, growing an inclusive economy, building capabilities, enhancing the capability of the state and leaders working together to solve complex problems.”. For further reading on the key issues, please refer to Annexure A: South African Government National Development Plan - 2030

2.4 Industrial Policy Action Plan 2014 to 2016

According to the Department of Trade and Industry for the Republic of South Africa Industrial Policy Action Plan (2013, p. 6), the Industrial Policy Action Plan (IPAP) 2013/14-2015/16 (IPAP 2013) is informed by the vision set out for South Africa’s development provided by the National Development Plan (NDP). It is located in the framework provided by the programmatic approach of the New Growth Path (NGP) and is one of the key pillars of that document.

According to a speech by the Minister of Department of Trade and Industry in 2013, Rob Davies:

“IPAP 2013 focuses on value added production with state support centred on nurturing and defending industrial development. IPAP is based on the need for sustainable long-term development that is underpinned by higher growth, exports and labour-intensive, value-adding economic activity in the production sectors, led by manufacturing.”

According to the Department of Trade and Industry for the Republic of South Africa Industrial Policy Action Plan (2013, p. 13), IPAP 2013 through its various iterations has sought to achieve the following key objectives:

- Enabling and strengthening the internal alignment and co-ordination between the Department of Trade and Industry divisions responsible for important related work, such as: industrial development; trade policy; investment and export promotion; incentive support and enterprise development.
- Continuously scaling-up transversal policy interventions by removing Key Action Plans (KAPs) that have been achieved and adding new ones where relevant and appropriate.
- Strengthening and deepening sector plans with the addition of new KAPs based on policy research and stakeholder engagement to identify and correct market failures in key sectors during the previous year. This process includes the removal of KAPs achieved and, in limited cases, the removal of those that for a variety of reasons have proven unworkable.
- Enabling and contributing to intra-governmental alignment and co-ordination across a range of Action Plans where other government departments have shared responsibility or are the lead department(s).

- Enabling and strengthening oversight of the time-bound Action Plans by the executive, parliament and society at large.

For further reading on key extracts from the IPAP, please refer to Annexure B: Policy Context for IPAP.

2.5 The IDC

The IDC is a pragmatic arm of the state, primarily focusing of industrial development through capital investments and non-financial assistance. The core focus of the IDC is sustainable economic development through concerted investments within the fundamental industries, which drive growth and employment within the economy. For further information on fundamental industries please refer to Annexure D: Table 4: Quantec Data Used and Data Referencing.

According to Minister Ebrahim Patel in the Forward of the IDC's Integrated Report (2013, p. II):

“The Industrial Development Corporation is an important national asset. It is the country’s largest development finance institution. It has a unique mandate: to industrialise South Africa and to grow decent and productive job opportunities. It has a strong balance sheet, a dedicated staff and a large industrial footprint. In 2009 I asked the IDC, on behalf of its sole shareholder, to use these strengths in mandate and resources to help respond to the recession caused by the global economic crisis; to support government efforts to develop a new growth path for the economy; to increase the level of industrial funding; to become more responsive to the needs of its users; and to retool itself to play a stronger developmental and empowering role.”

2.5.1 Current Assets Allocation Model of the IDC

Capital allocation is an intermediate step in the decision making process and not the final phase of the investment decision. The determination of which industries, projects and initiatives to invest in has multiple steps which require thoroughness. The IDC has established numerous benchmarking measures which are used to support the decision making process. The application information, benchmarking measures, strategic and social objectives are then combined and used in the final determination of capital allocation.

The rating of potential returns of individual projects or initiatives is not the primary focus of the IDC; instead, it aims to establish an appetite for the specific project or initiative based on strategic objectives for sustainable economic growth. Therefore, a clear consideration needs to be made when assessing potential candidates for capital allocation based on strategic mandates. This consideration should not be based on how much capital the initiative or project requires but rather how much additional support is required in order to achieve the targeted growth.

2.5.2 Types of Asset Assistance Offered by the IDC

The IDC strives to ensure that all initiatives or projects which are endeavoured are sustainable and deliver on the core requirements set out in the terms of engagement. Therefore, asset allocation can take various forms as assistance from the IDC, namely capital or non-capital allocation assistance.

2.5.2.1 Capital Allocation

The primary asset assistance the IDC offers is in the form of capital allocation. This capital allocation, depending on the requirements of the project or initiative, could take on the form of:

- Leverage financing;
- Unlevered financing;
- A combination of leveraged and unleveraged financing; and
- Other general industrial financing.

Through leveraged financing, the IDC issues the firm with a loan or debt financing which has strict repayment criteria and is usually issued with protective covenants. A key consideration for leveraged financing is the current gearing of the firm and the gearing appetite of the IDC which is based in industry-specific norms.

Unleveraged financing is issued through acquisition of a proportionate stake in the equity of the firm. The IDC usually issues unleveraged financing on the conditional basis that the equity stake, which the IDC owns, is bought back at a predetermined price or time with an additional incentive. Based on the firms gearing and the gearing appetite of the IDC, a combination of leveraged and unleveraged financing can be issued to a firm with the same provisions as outlined before. A key consideration when establishing the repayment criteria of capital allocated to firms is the current and future expected cash-flows of the firm. Specific moratoriums can be issued to firms, which have irregular or delayed expected cash-flows, in order to ensure the financial stability of the firm. A further consideration is made based on the Return After Tax Internal Rate of Return (RATIRR) expectations of the firm.

Other general industrial financing is given in the form of export/import finance; short-term trade finance; bridging finance and wholesale funding through intermediaries.

2.5.2.2 Non-Capital Allocation

Other forms of asset assistance which the IDC could engage in are:

- Guarantees;
- Administration costs subsidisation;
- Project assistance;
- Feasibility study assistance;
- Skills shortfall assistance through pre and post investment business support;
- Social-economic development services;
- Local development agencies;
- Policy and research support; and
- Capacity building at other DFIs.

When the IDC issues guarantees to a firm, it could be in the form of loan guarantees which the firm sources from the financial markets or, alternatively, the IDC could issue service guarantees. Service guarantees could take on many forms including rental provisions - which guarantee rental cash-flows - or product purchase guarantees – which guarantee purchasing of output products through contracts with other state-

owned entities such as state-owned power utility. An example of purchasing guarantees is Eskom purchasing power generated by green energy projects.

Administration costs could include, but are not limited to:

- Capital floatation costs;
- Legal expenses;
- Accounting expenses; and
- General administration expenses.

Furthermore, the IDC is in a position to waive these fees when engaging with firms through projects and initiatives.

Project assistance is predominantly given to larger projects or initiatives whereby the IDC works closer with the firm and provides the required expertise through contracting external consultants and internal IDC staff members with the required skill sets. A form of project assistance is business support grants.

Feasibility assistance is when the IDC acts as a partner. It is further aimed at ensuring that adequate feasibility assessments are completed to ensure the successful implementation of the project or initiative.

There are generally three broad classifications which require feasibility assistance. The first is when a project or initiative meets specific strategic objectives and is initiated from within the IDC. The second is when a firm's project or initiative meets the strategic objective of the IDC. In these instances, the IDC could give feasibility assistance through the supply of external consultants such as engineers, geologists or industry specific experts. And the final classification of feasibility assistance is limited to longer term projects or initiatives which generally exceed four years. These projects generally require in-depth feasibility analysis to ensure their successful implementation.

2.5.3 Capital Allocation Methodology

In order to understand the IDC capital allocation methodology, one needs to understand how the IDC is structured. Currently, the IDC has three primary operational divisions which steward specific areas of the relevant industry.

The first of the primary operational division is Agro and New Industries. The mandate of the Agro and New Industries division is to manage all investments and opportunities within the Agro-Industries; Green Industries; Strategic High-Impact Projects; and Venture Capital.

The second is Mining and Manufacturing Industries. This division's mandate is to manage all investments and opportunities within the Chemical and Allied Industries; Forestry and Wood Products; Metals, Transportation and Machinery Products; Mining and Minerals Beneficiations; and Textiles and Clothing.

The third and final primary operational division is the Services Industries. The mandate of the Services Industries division is to manage all investments and opportunities within the Information Communication; Technology; Healthcare; Media and Motion Picture; and Tourism.

When the IDC concludes capital allocation budgeting, it is based on two approaches: the top-down approach and the bottom-up approach.

The top-down approach is completed centrally within the IDC. This objective of the top-down approach is to ensure that capital allocation is based on the broad objectives of the IDC. The primary considerations for the top-down approach is:

- The forecasted growth per sector;

- Job intensity which is measured as a ratio of capital employed to employment created; rural development for industries;
- Strategic objectives of the government (which is the sole shareholder of the IDC) as outlined in the industrial development policy framework;
- Black Economic Empowerment (BEE) within the industry;
- Financial returns; and
- Risk per industry.

The aforementioned characteristics are used to create what is known as the attractiveness indicator. The attractiveness indicator is derived per industry and submitted as part of the application for consideration.

The bottom-up approach is employed by the three primary operational divisions and their subsequent subdivisions. The key considerations are based on the current projects in the pipeline; strategic objectives per sector - even where there are no projects or initiatives currently in place - and through-the-door business. Capital allocation budgeting is completed based on the potential opportunities which are available per sector; the limitations per sector are also considered. Limitations include:

- Industry capacity;
- Concentration risk;
- Countercyclical returns; and
- Capped growth.

Once the top-down and bottom-up budgeting approaches are completed, a central team and the three primary operations divisions meet to negotiate capital allocations per sector. The key considerations which all parties maintain throughout the capital allocation budgeting process are:

- The social objectives of the government; and
- The industrial development policy plan and the affordability of the IDC (available capital for current and new initiatives and projects).

It is important to note though that financial assistance through capital allocation is provided primarily for the development of new businesses; expansion of existing businesses or the rehabilitation of existing businesses. Considerations, however, are made towards to the economic ability of the firm through sustainable long-term profitability.

Key consideration of capital funding from the IDC through financing fixed assets and a fixed portion of growth in working capital requirements are:

- Equitable contribution expectation from financial assistance seekers;
- minimum investment amount from R1 million;
- Adequate security;
- Strict environmental compliance;
- Job creation;
- Entrepreneurial development;
- Small and medium enterprise development;
- Regional development where priority is given to rural areas, townships, provisional development needs as well as development in the rest of Africa;
- Priority sectors;
- Black economic development;
- Foreign currency earnings; and

- Environmental sustainability.

2.5.4 Current Capital Employed and Future Targets

The IDC has, in the past four years, approved R45 billion in project finance through a combination of leveraged and unleveraged financing. Since 2009, the IDC's new investments have grown the market value of the total asset base for the group from R89 billion to R127 billion according to the IDC's Integrated Report (2013). Additionally, the capital employed by the IDC over the last four years has directly contributed to the creation and saving of 133 000 jobs. There is thus an inference which can be drawn from these statistics, namely the job intensity ratio.

$$\begin{aligned}
 \text{Job Intensity Ratio}_{\text{over time } t} & \qquad \qquad \qquad 2.1 \\
 & = \frac{\text{Capital Employed}_{\text{over time } t}}{\text{Employment Created}_{\text{over time } t}}
 \end{aligned}$$

$$\begin{aligned}
 \text{Job Intensity Ratio}_{\text{over 4 years}} & = \frac{R45bn_{\text{over 4 years}}}{133\,000_{\text{over 4 years}}} \\
 & = R338,346
 \end{aligned}$$

The job intensity ratio over the last four years is R338,346. This essentially illustrates that a capital investment of R338,346 is required to create one new job. Therefore, the expected budget for 2014, which is estimated to have a total capital investment pool of R15 billion, should translate into 44,333 jobs being created and saved when using the job intensity ratio from the last four years. Capital investment opportunities for 2014 have been expanded to include new business funding, working

capital funding and higher risk investments. A breakdown of capital allocation for Agro and New Industries; Mining and Manufacturing Industries as well as Service Industries, over the last four years is highlighted in Annexure D: Table 11: Capital Allocation for Agro and New Industries; Table 12: Capital Allocation for Mining and Manufacturing Industries and Table 13: Capital Allocation for Service Industries respectfully.

2.6 Balanced and Sustainable Economic Growth

Balanced and sustainable economic growth can be described as a rate of growth which can be maintained over an extended period of time, without generating other substantial economic difficulties. Crucially, it is the primary driver for employment creation, which in turn drives poverty alleviation and industry competitiveness, and a core objective of the IDC..

In the absence of balanced and sustainable economic growth two main areas of economic growth emerge, namely excessive growth or, alternatively, low or negative growth.

Excessive growth generally leads to goods, services, house price and wage inflation; short-term labour shortages; declining savings; excessive credit and trade difficulties. Low or negative growth generally leads to goods, services and house price deflation; labour surpluses which lead to growth in unemployment; excessive debt burden and public sector debt. It is therefore critical that all initiatives or projects which the IDC either funds or engages in are sustainable over the longer term and contribute to sustainable economic growth.

However, South Africa is faced with a social, economic and financial dichotomy as expressed by Ojah and Mokoteli (2010). They elaborate by stating:

“The dichotomy is mirrored in the financial sector where, on one hand, there is a highly sophisticated system available to large firms and rich individuals and, on the other, there are many people who do not have adequate, if any, access to financial services.” (Ojah & Mokoteli, 2010, p. 6)

Understanding the challenges faced in the dual economy of the South African environment and the lack of adequate financial assistance is key in impelling strategy to drive sustainable economic growth. Ojah and Mokoteli (2010) further state that South Africa is currently under-financed in the development environment, while over-financed in the entrepreneurial environment; a state further exacerbated through the dichotomy in the financial sector. The IDC is mandated to furnish venture capital and financial assistance in developing sustainable industries to reduce the gap between these two unique economies, with development financing being a primary objective.

2.7 Economic Empowerment of the South African Population

According to the Department of Trade and Industry (DTI) web site (http://www.thedti.gov.za/economic_empowerment/economic_empowerment.jsp) their stance on economic empowerment is as follows:

“The DTI provides strategic direction in the development of policies and strategies that promote enterprise growth, empowerment and equity within the RSA economy.

There are various initiatives have been undertaken to implement Broad-Based Black Economic Empowerment (B-BBEE), including the establishment of B-BBEE Codes of Good Practice; the development of Sector Charters in Forestry, Tourism, Construction and Transport; accreditation of B-BBEE Verification Agencies; and establishment of the B-BBEE Advisory Council. The focus has also been on developing co-operatives, which operate in the mainly informal and

marginalised sector of the economy, as well as empowering women-owned businesses via the provision of financial and business development support services. These programmes involve continuous intergovernmental co-ordination and co-operation with government institutions.” (Department of Trade and Industry, Republic of South Africa, n.d.)

The economic development of South African Population refers to designated groups which need to be empowered.

2.8 IDC Benchmark Tracking

Given the complexities of balanced and sustainable economic growth, the IDC has a set of various metrics which they use track the progress of their initiatives and projects. These metrics measure and track:

- Financial stability;
- Employment generation to capital employment;
- Contribution to GDP;
- Industrial sector, geographical and rural reform;
- Growth in exports within the industry;
- Progression of Broad-Based Black Economic Empowerment (BBBEE);
- Early stage equity growth targets;
- Impairment targets; and
- Cost-to-income targets.

2.9 Capital Allocation Optimisation

Because of the portfolio divergence effects, there is no single way in which to carry out effective capital allocation without linking the methods to management rationale and taking cognisance of the limitations within the market.

Limitations which the IDC is faced with include:

- The size of the market;
- The market's appetite for growth within the sector or industry;
- Risk appetite, which is directly linked to the concentration risk within a specific industry or sector; and
- The availability of complementary services and manufacturing inputs, such as water supply for paper manufacturing in rural areas.

Currently, the IDC has a concentration risk towards commodity stock, and the capital allocated towards these industries is sunken for an extended period, generally five to six years. However, there is opportunity to trade out their position within these companies through equity share sale or changing current policies. Two primary examples of highly concentrated industries, in which the IDC finds itself, are petrochemicals (Sasol) and mining (Kumba).

The current capital allocation methodology utilised within the IDC is primarily focused on management rationale and strategic objectives, measured through the attractiveness model. Given the strategic objectives of the respective operational divisions, capital allocation is allocated based on the outcomes of the negotiations between the central team and the three primary operations divisions. Additionally, the limitations faced by the IDC further exacerbate the optimal capital allocation methodology.

Post negotiation of capital allocation, the capital allocation is accepted as being optimised. Any capital which is not effectively allocated or used within each of the divisions results in the targets not been met and capital not effectively allocated, and therefore not optimised. To assist the capital allocation prioritisation within each primary operational division, the IDC utilises the development scorecard.

2.10 Portfolio Optimisation

Portfolio optimisation is a strongly-developed field which matured from well-studied topics such as Markowitz's (1952) (1987) Mean-Variance Theory; Luenberger's (1998) Mean-Variance Portfolio Theory; Brooks' (2008) Long-Run Relationships in Finance; Sharpe's (1964) (2007) Theory of Expected Utility; and Keeney's (1992) Multi-Attribute Value Theory (MAVT).

Markowitz (1987) presents procedures, processes and systems of algorithms for solving portfolio selection problems through both the expected value (mean) and variance of portfolio returns when choosing the underlying assets within the portfolio.

Sharpe (2007) however uses the mathematical expectation to determine which option people are likely to go with when faced with uncertain outcomes. Variations within the probabilities of occurrences, associated risk and utility, are used to derive a function of pay-outs. Similarly, Keeney (1992) uses MAVT to evaluate alternative scenarios with conflicting objectives, namely that for any given objective, multiple attributes can be used to measure performance relative to the objective.

Investment decisions by the IDC are extremely important, not only from a strategic objective perspective, but also from a limit resource point of view. Effective portfolio selection plays a key role in achieving the goals of the IDC. According to Salo, et al. (2011) resource allocation in governmental institutions is often complicated by technical as well as social perspectives. Salo, et al. (2011) elaborates on the point of

technical difficulty by explaining that it comprises of the assessment of a large number of projects or initiatives which require funding, while often these projects or initiatives have conflicting objectives. The social difficulty arises, according to Salo, from the number of stakeholders with varying views on attaining the objectives. Utilising the screening criteria as well as decision-making tools such as the development scorecard and attractiveness model often eliminates initiatives which are not in accordance with the objectives of the IDC or its stakeholders.

Chapter 3

Data

3.1 Development Scorecard

The IDC's development scorecard is proprietary property of the IDC, and the actual calculations used within the various sections, will not be unpacked in this paper.

This scorecard comprises six broad categories which measure a firm's ability, using key criteria identified by the IDC, to achieve the IDC's targets of sustainable economic development.

The six broad categories have a number of sub-categories which have scores associated with differing levels of compliance. The scores are then weighted against the IDC's associated weighting scale to determine the development score per application. The downside associated with the development scorecard is that it is only used in the final process of the application life-cycle. Only those applications which have a high probability of receiving assistance from the IDC are scored. The applications which are not scored are rooted out during the selection process.

The six broad categories of the development scorecard are outlines below:

3.1.1 Job Creation

The job creation category measures the degree to which an investment by the IDC would contribute towards job creation in the country. This is calculated by determining the number of permanent equivalent new jobs being created and then

multiplying this against the applicable weighting. Job creation can be broken down into six sub-categories:

3.1.1.1 New Permanent Direct Jobs

This category refers to new permanent direct workers employed as a result of the investment and is measured on the number of new permanent direct jobs created. To qualify as a new permanent direct job, the following criteria need to be fulfilled:

- A permanent direct worker is a person employed by the company for the whole year, every year, for at least three years;
- Workers would typically draw salaries or wages directly from the company being funded;
- Any worker employed for less than three years should be treated as a temporary worker.

3.1.1.2 New Permanent Outsourced Jobs

The category pertains to any new workers that would be required to work at the company being financed as a result of the investment, but not necessarily drawing salaries or wages from the company itself:

- These could include workers involved in catering, security, cleaning or any other service that requires a service provider to employ new people;
- There would typically be a contract between the company being financed and the service provider;

- Care should be taken that the creation of these jobs can be verified at a later stage as these workers would not appear in the company's Human Resources records.

3.1.1.3 New Seasonal Direct Jobs

New seasonal direct workers as a result of the investment:

- A seasonal worker is a person that will be employed by the company for a part of the year, every year;
- Seasonal jobs need to be annualised;
- New seasonal direct jobs adjustment factor:

$$\begin{aligned}
 &PENJ && 3.1 \\
 &= NSDJ \\
 &\times \frac{Nr. \text{ of months employed per year}}{12}
 \end{aligned}$$

Where:

PENJ is the Permanent Equivalent New Jobs

NSDJ is the New Seasonal Direct Jobs

3.1.1.4 New Temporary Direct Jobs

New temporary workers as a result of the investment:

- A temporary worker is a person that will be employed for a fixed, limited period only;
- Examples include people employed during construction, actors in a movie production, etc.;
- Any workers employed for more than three years are treated as permanent workers;
- Temporary jobs need to be annualised
- New temporary direct jobs adjustment factor:

$$\begin{aligned}
 & \text{PENJ} && 3.2 \\
 & = \text{NTDJ} \\
 & \times \frac{\text{Nr. of months employed per year}}{36}
 \end{aligned}$$

Where:

PENJ is the Permanent Equivalent New Jobs

NTDJ is the New Temporary Direct Jobs

3.1.1.5 Jobs Saved

Jobs saved can be counted under the following circumstances:

- Jobs could not have been counted previously (as jobs created or saved);
- New money has to be advanced;
- Company must be facing liquidation or downsizing if IDC does not invest;

- Rules for seasonal and temporary jobs apply.

3.1.1.6 Indirect Jobs

Indirect jobs are jobs that are created in upstream or downstream businesses as a result of the investment. Examples could include jobs created at an iron ore mine that would need to be expanded to supply a smelter that IDC is funding. These jobs cannot be counted if the IDC is not funding the upstream or downstream business.

3.1.2 Supporting Industrial Capacity Development

This is calculated by determining whether the firm is operating in one of the industries listed on the industry or sector priority list. If the firm is operating in one of the priority industries or sectors, a score is given based on which policies it complies with. Supporting Industrial Capacity Development can be broken down into five main sub-categories:

3.1.2.1 Supporting Government Priority Industries

This category is applicable if the firm operates in one of the government's priority industries and measures IDC's financial support for industries identified as being of high importance to the country. Three primary policies regulate the priority industries as identified by government, namely:

3.1.2.1.1 Industrial Policy Action Plan (IPAP)

Applicable if the firm operates in one of the lead sectors as identified in the IPAP as priority industries. Examples of IPAP priority industries are:

- Capital/Transport Equipment and Metals;
- Automotive and Automotive Components;
- Chemicals, Plastic Fabrication and Pharmaceuticals;
- Forestry, Pulp and Paper, and Furniture;
- Clothing and Textiles.

3.1.2.1.2 National Industrial Policy Framework (NIPF)

Applicable if the firm operates in one of the sectorial groupings as identified in the NIPF as priority sectors. Examples of NIPF sectorial groupings are:

- Natural resource based sectors
 - Includes mining, agriculture, oil and gas, pulp and paper;
- Medium technology sectors, including downstream mineral beneficiation
 - Includes metals fabrication, machinery and equipment, chemicals and plastics, pulp and paper, oil and gas, and jewellery;
- Advanced manufacturing sectors
 - Includes automotive, aerospace, electronics, and nuclear energy;
- Labour intensive sectors
 - Includes primary agriculture, forestry, fishing, certain parts of mining, clothing and textiles, footwear, food, beverages, and furniture;
- Tradable services

- Includes business process outsourcing, ICT services, engineering, construction, mining services, and film.

3.1.2.1.3 Accelerated and Shared Growth Initiative for South Africa (AsgiSA)

Applicable if the firm operates in one of the top priority sectors as identified in the AsgiSA. Examples of AsgiSA top priority sectors are:

- Tourism;
- Business Process Outsourcing;
- Biofuels.

3.1.2.2 Sector Development Strategy Implementation

The sector development strategy implementation is only applicable if the firm operates in one of the approved industries listed in the sector development strategy as approved by IDC's executive committee.

3.1.2.3 Development of Emerging Industries

The development of emerging industries sub-category measures the support for the establishment of new industries. The emphasis is on sub-sectors that are not necessarily present at the moment, but which are starting to emerge as a result of new technology and changing consumer tastes. The measurement is applicable if the firm operates in one of the identified emerging industrial sectors as identified by the IDC and its relevant stakeholders.

3.1.2.4 Export Development

The export development category measures the degree to which an investment by the IDC would contribute towards an increase in annual exports or foreign currency earnings as a direct result of the investment. The scoring is based on two factors, namely:

3.1.2.4.1 Value of Incremental Exports

Score is attributed based on the Rand value range of the incremental exports.

3.1.2.4.1 Proportion of Firm's Turnover Received from Exports

Score is attributed based on the percentage of the firm's turnover received from foreign sources.

3.1.2.5 Contributing to Gross Domestic Product Growth

The contributing to Gross Domestic Product (GDP) growth category measures the extent to the firm adds value to the country's economy. The measure calculates the value add as a proportion of total sales.

$$Value\ Add_t = \frac{(Sales_t - RMC_t - OeSW_t)}{Sales_t} \times 100 \quad 3.3$$

Where:

RMC_t is the Raw Material Cost at time t

$OeSW_t$ is the Overheads excluding Salaries and Wages at time t

3.1.3 Support for Entrepreneurs

The support for entrepreneurs' category measures whether an investment constitutes support for new entrepreneurs as well as small and medium enterprises. Support for entrepreneurs can be broken down into two main sub-categories:

3.1.3.1 Support for New Entrepreneurs

Support for new entrepreneurs comprises of two primary measurements which constitute the definitions of new entrepreneurs as defined by the IDC, namely:

3.1.3.1.1 Entrepreneurial Development

Entrepreneurial development is scored on:

- Involvement in the day-to-day management of the business by the majority of the firm's owners;
- Proportion of personal financial risk taken by the majority of the business owners in establishing the business; and
- The age of the firm.

3.1.3.1.2 Priority Groups for Entrepreneurial Development

Priority groups for entrepreneurial development are scored on the level of ownership and control by priority groups as defined by the IDC, government and stakeholders.

3.1.3.2 Support for Small and Medium Enterprises (SMEs)

Support for small and medium enterprises measures the IDC's support for SMEs and comprises of three primary indicators, namely:

3.1.3.2.1 Employment

Employment scores the relative total full-time equivalent number of employees. In the case of start-up firms, employment at time of full production is used.

3.1.3.2.2 Turnover

Turnover scores the relative total annual turnover of the firm. In the case of start-up firms, the turnover at time of full production is used.

3.1.3.2.1 Assets

Assets score the relative total assets of the firm. In the case of start-up firms, the turnover at time of full production is used.

3.1.4 Support for Broad-Based Black Economic Empowerment (B-BBEE)

B-BBEE measures the IDC's support for B-BBEE as evident in the B-BBEE status of the firms that are funded by the IDC. The scoring methodology applied is, as far as possible, in line with the scoring of the *Codes of Good Practice on Black Economic Empowerment* (Department of Trade and Industry, Republic of South Africa, 2013). Support for B-BBEE can be broken down into four main sub-categories:

3.1.4.1 Exempted Micro Enterprises

Exempted micro-enterprises automatically qualify as level 4 contributors and qualify for additional score recognition if the enterprise is more than 50% owned by black people.

3.1.4.2 Qualifying Small Enterprises

Qualifying Small Enterprises (QSE) are measured based on ownership as per Code 801 to 807 of the QSE scorecard. Score is attributed based on:

- Valid BEE verification certificate;
- Management control;
- Employment equity;
- Skills development;
- Preferential procurement;
- Enterprise development; and
- Socio-economic development initiatives.

3.1.4.3 Public Entities and Other Specialised Enterprises

Public entities and other specialised enterprises are measured based on ownership as per Code 200, 300, 400, 500, 600 and 700 of the Generic scorecard. Score is attributed based on:

- Management control;
- Employment equity;
- Skills development;
- Preferential procurement;
- Enterprise development; and
- Socio-economic development initiatives.

3.1.4.4 All Other Enterprises

All other enterprises are measured based on ownership as per Code 100, 200, 300, 400, 500, 600 and 700 of the Generic scorecard. Score is attributed based on:

- Ownership;
- Management control;
- Employment equity;
- Skills development;
- Preferential procurement;
- Enterprise development; and
- Socio-economic development initiatives.

3.1.5 Supporting Regional Development

The supporting regional development category measures the degree to which an investment by the IDC would contribute towards development of local markets which have been identified as key strategic objectives. The scoring is based on six sub-categories.

3.1.5.1 Promoting Provincial Equality

Development within non-traditional provinces are attributed a large score as these provinces require enterprise development to achieve governmental development requirements.

3.1.5.2 Supporting Development of Rural Areas

Supporting development of rural areas measures whether an investment contributes to rural development. The location of the development is determined and accordingly scored.

3.1.5.3 Supporting Development of Townships

Supporting development of townships measures whether an investment contributes to township development. The measure is broken down into three primary measures, namely:

3.1.5.3.1 Urban Renewal Programme

An urban renewal programme takes into account whether the investment is within a township located in one of the Urban Renewal Programme nodes.

3.1.5.3.2 Township not Part of Urban Renewal Programme

The township is not part of the urban renewal programme however meets the definition of a township, as defined by the IDC, then this measure would account for it.

3.1.5.3.3 Areas Bordering Townships

Areas bordering townships accounts for whether the investment is within industrial area directly bordering townships, as defined by the IDC.

3.1.5.4 Supporting Investment in Industrial Development Zones (IDZ) and Spatial Development Initiatives (SDI) of Townships

Supporting investment in IDZ and SDI of townships measures whether an investment takes place within an IDZ or SDI, as defined by the IDC.

3.1.5.5 Development of the Rest of Africa

Development of the rest of Africa measures whether the investment contributes to development within the specified list of African countries which the IDC supports.

3.1.6 Promoting Environmental Sustainability

Promoting environmental sustainability measures the IDC's support for investments that encourage sustainable use of natural resources.

3.2 IDC Approved Application Data

Data is limited to all applications approved with committed capital obligations for the period 2010 to 2014. Approval of applications does not necessarily constitute capital take-up by the applicant. Due to the fact that capital is committed in advance, capital obligations for 2014 is available, save for new applications approved post December 2013.

The IDC approved application data was received in excel format with in depth demographic and application characteristics. Short comings in the data is the unavailability of primary objectives development scorecard scoring data in time for inclusion in this research report.

The data was manipulated to align the SIC classifications to those extracted and used from the Quantec industry data.

3.3 Quantec Industry Data

Quantec Research (Pty) Ltd has a collection of SA standardised industry indicator database. The specific data which was extracted for inclusion in this research report was limited to the sector industry indicators which are based on a time series starting from 1970. This SIC classifications industry data is based on a level 3 SIC and are normalised to 2005 as the primary reference for normalisation. Specific SIC codes as identified as priority strategic industries through various governmental policies and IDC strategic objects was used to trim down the data the specific SIC classifications. Comprehensive database information guide is available on www.quantec.co.za.

Chapter 4

Methodology

4.1 Modern Portfolio Theory (MPT)

MPT is a fundamental theory of finance which attempts to maximise portfolio expected returns for a given amount of portfolio risk. Conversely MPT could be used to minimise risk for a given level of expected return.

According to e-Managed Futures (2011), MPT is a mathematical articulation around the theory of portfolio diversification in investing. The primary objective is to select a portfolio which collectively has lower risk than any individual underlying asset. This is achieved through differing types of assets which change value in opposite directions.

Under MPT, the asset's return is modelled as a normally distributed function. It further defines risk as the standard deviation of return and simulates theoretical portfolios as weighted combinations of assets. Therefore the portfolio returns are a weighted combination of the asset's returns. MPT ultimately, seeks to reduce the asset's variance of portfolio returns.

MPT has the following assumptions:

- Investors are risk adverse and would want to be compensated for additional risk;
- Investors are rational; and
- Markets are efficient.

MPT Expected Return:

$$E(R_p) = \sum_i \omega_i E(R_i) \quad 4.1$$

Where

R_p is the portfolio return

R_i is the return on asset i

w_i is the weighting of asset i in the portfolio

MPT Return Variance:

$$\sigma_p^2 = \sum_i \omega_i^2 \sigma_i^2 + \sum_i \sum_{j \neq i} \omega_i \omega_j \sigma_i \sigma_j \rho_{ij} \quad 4.2$$

Where

ρ_{ij} is the correlation coefficient between returns on assets i and j

R_i is the return on asset i

w_i is the weighting of asset i in the portfolio

MPT Portfolio Return Volatility:

$$\sigma_p = \sqrt{\sigma_p^2} \quad 4.3$$

4.2 Markowitz's Mean-Variance Theory (MMVT)

The MMVT models the rate of return on assets as random variables. The essence of the MMVT is to choose the weighting factors of the portfolio in an optimal way. An optimal set of weights is classified as one where the portfolio achieves an acceptable expected rate of return with minimal volatility. The variance of the rate of return is used as proxy for volatility. According to (Luenberger, 1998), Sigman (2005) and Campbell & Viceira (1999) MMVT can be described as:

MMVT return on the asset:

$$R = \frac{x_1}{x_0} \quad 4.4$$

Where

x_0 is the asset purchase price

x_1 is the asset sale price

MMVT rate of return on the asset:

$$r = \frac{x_1 - x_0}{x_0} = R - 1 \quad 4.5$$

Therefore

$$x_1 = Rx_0 \quad 4.6$$

And

$$x_1 = (1 + r)x_0 \quad 4.7$$

Weights can be defined as the proportion of capital invested in asset i . To preserve budget constraints, we require the sum of weights to equal 1, that is:

$$\sum_{i=1}^n \omega_i x_0 = x_0 \sum_{i=1}^n \omega_i = x_0 \quad 4.8$$

The total receipts of the portfolio are given by:

$$x_1 = \sum_{i=1}^n R_i \omega_i x_0 = x_0 \sum_{i=1}^n R_i \omega_i \quad 4.9$$

The total return of the portfolio is given by:

$$R = \sum_{i=1}^n R_i \omega_i \quad 4.10$$

The rate of return of the portfolio is given by:

$$\begin{aligned}
 r = R - 1 &= \left(\sum_{i=1}^n R_i \omega_i \right) - \left(\sum_{i=1}^n \omega_i \right) & 4.11 \\
 &= \sum_{i=1}^n (R_i - 1) \omega_i = \sum_{i=1}^n r_i \omega_i
 \end{aligned}$$

The portfolio can equivalently be described by $(\omega_1, \omega_2, \dots, \omega_n)$ with rate of return:

$$r = \sum_{i=1}^n r_i \omega_i \quad 4.12$$

And the expected rate of return:

$$\bar{r} = E(r) = \sum_{i=1}^n \bar{r}_i \omega_i \quad 4.13$$

Letting

$$\sigma^2 = \text{Var}(r_i) = E(r_i^2) - \bar{r}_i^2 \quad 4.14$$

And

$$\sigma_{ij} = \text{Cov}(r_i, r_j) = E(r_i r_j) - \bar{r}_i \bar{r}_j \quad 4.15$$

The variance of the rate of return of the portfolio is given by:

$$\sigma^2 = Var(r) = \sum_{i=1}^n \sigma_i^2 \omega_i + 2 \sum_{1 \leq i < j \leq n} \sigma_{ij} \omega_i \omega_j \quad 4.16$$

Where σ^2 is the measure of risk involved for this portfolio, it is essentially the measure of how far from the mean \bar{r} the true rate of return r could be.

The value of x_0 is not needed in determining performance, only the proportions $(\omega_1, \omega_2, \dots, \omega_n)$ are needed. If you invest R1 or R1m, the values of r , \bar{r} and σ^2 are the same when the proportions are the same. In effect, any portfolio can simply be described by a vector:

$$z = \begin{pmatrix} \omega_1 \\ \vdots \\ \omega_n \end{pmatrix} \quad 4.17$$

Where

$$\sum_{i=1}^n \omega_i = 1 \quad 4.18$$

Therefore σ^2 can be obtained through:

$$\sigma^2 = \min(\sigma_1^2, \sigma_2^2, \dots, \sigma_n^2) \quad 4.19$$

And investing all of x_0 in the asset with the smallest variance. However, investing in more than one asset can reduce the variance even further; this is one of the main advantages of investing in more than one asset, it reduces risk. The larger the diversification the smaller the risk becomes, tending towards 0, while the rate of return remains the same.

An optimal portfolio can be described by performing as (\bar{r}, σ) , where \bar{r} is the desired average rate of return, and σ^2 the minimal variance possible for this given \bar{r} .

Consequently, from the IDC's portfolio perspective, it would be crucial to find the highest rate of return possible for a given acceptable level of risk. It is therefore necessary to compute the weights corresponding to such an optimal portfolio. For portfolios of n risky assets, we require the solution to:

$$\text{minimise } \sum_{i=1}^n \sigma_i^2 \omega_i^2 + 2 \sum_{1 \leq i < j \leq n} \sigma_{ij} \omega_i \omega_j \quad 4.20$$

$$\text{subject to } \sum_{i=1}^n \omega_i \bar{r}_i = \bar{r} \quad 4.21$$

Here, \bar{r} is a fixed pre-desired level for expected rate of return, and a solution is any portfolio $(\omega_1, \omega_2, \dots, \omega_n)$ that minimises the variance and offers expected rate \bar{r} . This is an example of a quadratic program, an optimisation problem with a quadratic objective function, and linear constraints. Fortunately, this particular quadratic programme can be reduced to a problem of merely solving linear equations. For further reading on utilising quadratic programming to solve for Markowitz, please refer to Annexure C: The Karush-Kuhn-Tucker (KKT) Conditions.

Since the objective function is non-negative, it can be multiplied by any non-negative constant without changing the solution. Moreover, we can simplify notation by using the fact that $\sigma_{ii} = \sigma_i^2$. The following equivalent formulation is the most common in the literature such as to (Luenberger, 1998), Sigman (2005) and Campbell & Viceira (1999):

$$\text{minimise } \frac{1}{2} \sum_{i,j=1}^n \sigma_{ij} \omega_i \omega_j \quad 4.22$$

$$\text{subject to } \sum_{i=1}^n \omega_i \bar{r}_i = \bar{r} \quad 4.23$$

$$\sum_{i=1}^n \omega_i = 1 \quad 4.24$$

The solution is obtained by using the standard technique from calculus of introducing two more variables called *Lagrange multipliers*, λ and μ , thereby forming the *Lagrange*:

$$L = \frac{1}{2} \sum_{i,j=1}^n \sigma_{ij} \omega_i \omega_j - \lambda \left(\sum_{i=1}^n \omega_i \bar{r}_i - \bar{r} \right) - \mu \left(\sum_{i=1}^n \omega_i - 1 \right) \quad 4.25$$

Setting

$$\frac{\partial L}{\partial \omega_i} = 0 \quad 4.26$$

For each of the n weight variables ω_i yields n equations:

$$\sum_{j=1}^n \sigma_{ij} \omega_j - \lambda \bar{r}_i - \mu = 0, \quad i \in \{1, 2, \dots, n\} \quad 4.27$$

Each equation 4.27 is linear in the $n + 2$ variables $(\omega_1, \omega_2, \dots, \omega_n, \lambda, \mu)$ and together with the remaining two linear constraints 4.23 and 4.24, yields a set of $n + 2$ linear equations with $n + 2$ unknowns. Therefore a solution to the Markowitz problem is found by ascertaining a solution $(\omega_1, \omega_2, \dots, \omega_n, \lambda, \mu)$ to the set of $n + 2$ linear equations. Taking equation 4.27, and:

$$\sum_{j=1}^n \omega_j \bar{r}_i = \bar{r}$$

And

$$\sum_{j=1}^n \omega_j = 1$$

And using the weights $(\omega_1, \omega_2, \dots, \omega_n)$ as the solution.

In the end, the problem falls into the standard framework of linear algebra, and amounts to computing the inverse of a matrix: solve $Ax = b$; solution $x = A^{-1}b$. The Markowitz problem will only have a solution for values of \bar{r} that are feasible and can be achieved by equation 4.23 from some portfolio $(\omega_1, \omega_2, \dots, \omega_n)$.

Overall, there is consideration for the set of all feasible pairs (\bar{r}, σ) ; those pairs for which there exists a portfolio $(\omega_1, \omega_2, \dots, \omega_n)$ such that equation 4.23 and:

$$\sum_{i,j=1}^n \sigma_{ij} \omega_i \omega_j = \sigma^2 \quad 4.28$$

The set of all feasible pairs is a subset of the two-dimensional $\sigma - \bar{r}$ plane, and is called the feasible set. For each fixed \bar{r} the Markowitz problem yields that feasible pair (\bar{r}, σ) with the smallest σ . As \bar{r} varies to obtain all such pairs, the minimum-variance set is obtained, which is a subset of the feasible set. In general σ will increase as you increase your desired level of expected return \bar{r} . This pair denoted by (\bar{r}^*, σ^*) is called the minimum-variance point.

The Markowitz problem can be modified to find the minimum-variance portfolio as follows:

If the requirement of expected rate of return be equal to a given level \bar{r} is left out, then the Markowitz problem becomes equation 4.22 and 4.24 and its solution yields the minimum-variance portfolio for n risky assets. Lagrangian methods can be employed where the requirement is only for one new variable μ , Therefore:

$$L = \frac{1}{2} \sum_{i,j=1}^n \sigma_{ij} \omega_i \omega_j - \mu \left(\sum_{i=1}^n \omega_i - 1 \right) \quad 4.29$$

And the solution reduces to solving $n + 1$ equations with $n + 1$ unknowns:

$$\sum_{j=1}^n \sigma_{ij} \omega_j - \mu = 0, \quad i \in \{1, 2, \dots, n\} \quad 4.30$$

And

$$\sum_{j=1}^n \omega_j = 1$$

4.3 Efficient Frontier

The efficient frontier uses two measures, firstly the expected return of a portfolio of assets and secondly the associated risk or volatility of the specific portfolio. Portfolios situated along the efficient frontier line represent the most “optimal” portfolio and mix of assets based on the expected return of the portfolio for investors when compared to the level of risk the investor will assume.

According to Jobson & Korkie (1980):

“The theory of portfolio analysis involves the determination of sets of assets that are efficient in a risk-return space. Efficient portfolios are those combinations of assets that have maximum return for a given level of risk or, alternatively, minimum risk for a given level of return.”

Jobson & Korkie (1980) further define efficient portfolio as:

“An efficient portfolio (allowing unrestricted short sales of assets) is determined by minimising portfolio variance, subject to a mean portfolio

premium return and the additional constraint that investment proportions in risky assets sum to one.”

Now suppose (\bar{r}^*, σ^*) is the minimum-variance point. Plotting a graph with the pairs (\bar{r}, σ) in the minimum-variance set satisfying $\bar{r} \geq \bar{r}^*$ this set of pairs is called the efficient frontier and corresponds to what are called the efficient portfolios. As \bar{r} increases, σ increases too – a higher rate of return involves higher risk. The efficient frontier traces out an increasing curve in the $\sigma - \bar{r}$ plane. An example of the efficient frontier graph is given in figure 1 below.

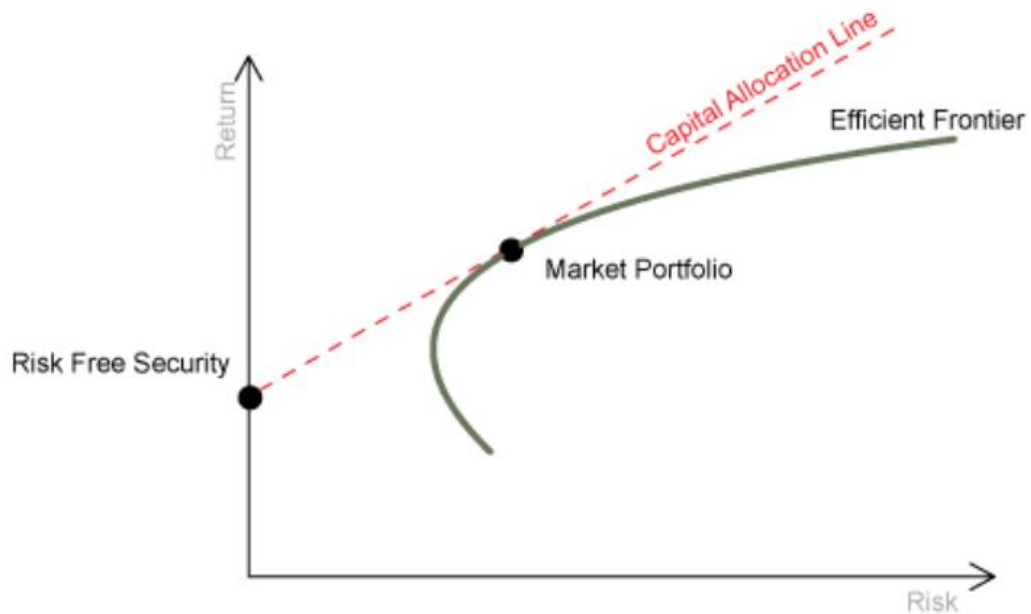


Figure 1: The Efficient Frontier Example

Chapter 5

Empirical Results

5.1 Introduction

The rating of potential returns of individual projects or initiatives is not the primary focus of the IDC; instead, it aims to establish an appetite for the specific project or initiative based on achieving their six strategic objectives, namely:

- i. Job creation;
- ii. Supporting industrial capacity development;
- iii. Supporting entrepreneurs;
- iv. Supporting BBBEE;
- v. Supporting regional development; and
- vi. Promoting environmental sustainability.

The analysis is limited to the first two strategic objectives, as outlined above, due to limitations in the data. Furthermore, the data will be limited to the priority industries, as identified by the Sector Industry Codes (SIC) as outlined in:

- NGP;
- NDP 2030;
- IPAP 2014 to 2016; and
- IDC strategic industries.

The Priority Industry SIC classifications, as outlined in Table 14: Quantec Data Used and Data Referencing (Quantec), will be used. The Quantec data is limited to level 1, 2 and 3 SIC classifications.

There are three scenarios which are completed through the model:

i. Scenario 1

This scenario allows the weights to vary from -100% to 100%. The focus is to analyse what an optimised portfolio would look like if the IDC was allowed to divest. The relative proportion which the IDC can divest would be identified by the weight relative to the total investment desired. Concentration risk is ignored in this scenario. Furthermore, this scenario allows the model to invest and divest up to 100% within specific priority sectors. The scenario assumes that there is no concentration risk and the market has uncapped appetite for capital investment.

ii. Scenario 2

This scenario allows the weights to vary from 0% to 100%. The focus is to analyse what an optimised portfolio would look like if the IDC was allowed to invest all capital into a specific priority sector. Concentration risk is ignored in this scenario. The scenario assumes that there is no concentration risk and the market has uncapped appetite for capital investment. Furthermore, it assumes that previous capital invested is committed and cannot be divested.

iii. Scenario 3

This scenario is more realistic and will be the emphasis of the analysis. The scenario allows the weights to vary from 2% to 20% per priority

sector. The requirements for a minimum investment is to ensure that all priority industries get a minimum investment proportion of total capital invested. Concentration risk is taken into account in this scenario through limiting the maximum investment proportion per priority industry. This scenario assumes that previous capital invested is committed and cannot be divested.

5.2 Job Creation

Job creation is captured within the formal employment data of Quantec. Table 15: Formal Employment per Priority Industry, which highlights the number of formally employed people within the priority industry as identified by the specific columns.

Table 17: Formal Employment Industry Contribution per Priority Industry features the relative size which each specific priority industry contributes to the overall industries formal employment number.

Table 18: Formal Employment Growth Rate per Priority Industry is calculated using equation 4.7 and illustrates the respective formal employment growth experienced within each priority industry.

Table 16: Data Statistics for Formal Employment per Priority Industry and Table 19: Data Statistics for Formal Employment Growth Rate per Priority Industry gives key insights into the central tendency and spread from the mean of formal employment within the specific priority industries. Furthermore, it facilitates the understanding of the range and shape of the distribution for formal employment.

Inferences could be drawn through the identification of specific priority industries which have opportunity for formal employment growth. It further facilitates

the prioritisation process as the relative size of the formally employed population per priority sector needs to be accounted for when making capital allocation decisions.

An example of the highest formal employment contributing priority industries in 2012 was firstly, Finance and Insurance with 17.99%, and secondly Wholesale; Retail Trade; Hotels and Restaurants with 16.58%. When considering the relative size of the two specific priority industries, it is 1,835,831 and 1,691,468 formally employed people respectfully. These two priority industries have a formal employment growth rate, for the period 1970 to 2012, of 5.9% and 1.5% respectfully. These growth rates are above the industry average of 0.7% throughout the same time period. When considering the 2012 growth rates, these priority industries have dropped below their means and are resting at 0.85% and 1.39% respectfully. This highlights that Finance and Insurance are currently growing below the industry average of 1.26%.

Graphs in Figure 7: Formal Employment Graphs per Priority Industry as well as Figure 8: Formal Employment Growth Rate Graphs per Priority Industry are graphical representations of the data in Table 15 and Table 18.

Table 20: The Correlation Matrix for Growth Rates of Formal Employment per Priority Industry is used in the Markowitz portfolio optimisation model for determining the optimal portfolio weights to maximise the growth rate of formal employment whilst minimising the relative risk, which is measured through the volatility of the growth rates. The correlation matrix in general when considering two assets, has the desirable effect of lowering the portfolio risk when those asset's returns are negatively correlated. The set of minimum variance portfolios is represented by a parabolic curve as expressed in the efficiency frontier as outlined in Figure 1: The Efficient Frontier Example and Figures 2, 10 and 11 for formal employment under scenario 1, 2 and 3 respectively.

The key parameters and inputs which are used within each of the three scenarios for formal employment are outlined in Table 1 and 2. The expected return is the mean of the growth rates per priority industry. One of the key inputs for the Markowitz model

is the risk-free rate. In order to ensure consistency, the industry mean formal growth rate was used across all scenarios. The expected growth rate which the model is bound to has an upper and lower limit of 10% and 20% for Scenario 1; 0% and 20% for Scenario 2, and 0% and 10% for scenario 3. The upper and lower bound for risk is 6% and 10% for Scenario 1; 0% and 20% for Scenario 2 and 0% and 10% for Scenario 3.

	All Scenarios
N Stocks	17
A	6.00
r_f	0.72%
Avg Corr	0.268379412

		Scenario 1	Scenario 2	Scenario 3
Exp Ret	Min	10%	0%	0%
	Max	20%	20%	10%
Std Dev	Min	6%	0%	0%
	Max	10%	20%	10%

Table 1: Formal Employment: Model Parameters

Industries	Exp Ret	Std Dev	Scenario 1		Scenario 2		Scenario 3	
			Weight Limits		Weight Limits		Weight Limits	
			Min	Max	Min	Max	Min	Max
1	-2.34%	4.33%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
2	0.46%	3.36%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
3	-2.17%	4.64%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
4	0.90%	2.38%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
5	1.08%	3.90%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
6	-1.05%	6.66%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
7	0.33%	3.84%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
8	-0.15%	4.70%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
9	1.70%	10.66%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
10	0.99%	4.96%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
11	1.61%	5.01%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
12	2.70%	5.60%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
13	-0.21%	9.28%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
14	1.50%	1.92%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
15	-0.02%	3.41%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
16	5.90%	3.17%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
17	3.01%	3.83%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%

Table 2: Formal Employment: Model Inputs

The outcomes of the Markowitz model for formal employment, given the listed parameters, inputs, key drivers, bounds and priority industry growth rates are outlined in the summary Table 3, for the respective scenarios.

It is of particular interest to note that the ranking of the risk through weights is not preserved when amending the constraints. Scenario 1 ranks Finance and Insurance as the highest weighting if the objective was to minimise volatility whilst Scenario 2 gives the highest ranking to Wholesale, Retail Trade, Hotels and Restaurants and Scenario 3 ranks two variable with the highest weighting, firstly Paper, Paper Products, Printing, Publishing and Recorded Media and secondly Wholesale, Retail Trade, Hotels and Restaurants.

In Scenario 1, the expected growth rate of the optimised portfolio ranges up to 21.82% depending on the primary driver of maximising growth versus minimising volatility. This is only achievable through the effect known as leverage financing. Exiting capital which is invested in low-performing growth priority sectors could be reinvested in higher performing priority sectors.

Therefore, if the IDC started with R1 million, they could effectively invest R2 million into high-performing priority industries whilst reducing their exposure to low-performing industries.

However, Scenarios 2 and 3 have a maximum growth rate of the optimised portfolio as 5.9% and 2.58% respectfully. These are more realistic expectations as capital diversion has many complications associated with it, including legal obligations.

Scenario 2 highlights an important condition which needs to be taken into account when applying portfolio optimisation, namely: minimising the volatility of the portfolio will reduce the range of expected growth rates. This, however, could have the negative consequence of encountering a higher probability of negative growth rates.

A portfolio is only efficient if the expected return of the optimised portfolio is greater than the global minimum variances expected return. Only then is the portfolio an efficient frontier portfolio.

Figure 2 below and Figures 10 and 11 in Annexure E represent the efficient frontiers for Scenarios 1, 2 and 3 respectfully. The scattered numbers represent a portfolio with a mix of priority industries, and those closest to the efficient frontier are expected to have the best return based on the relative risk.

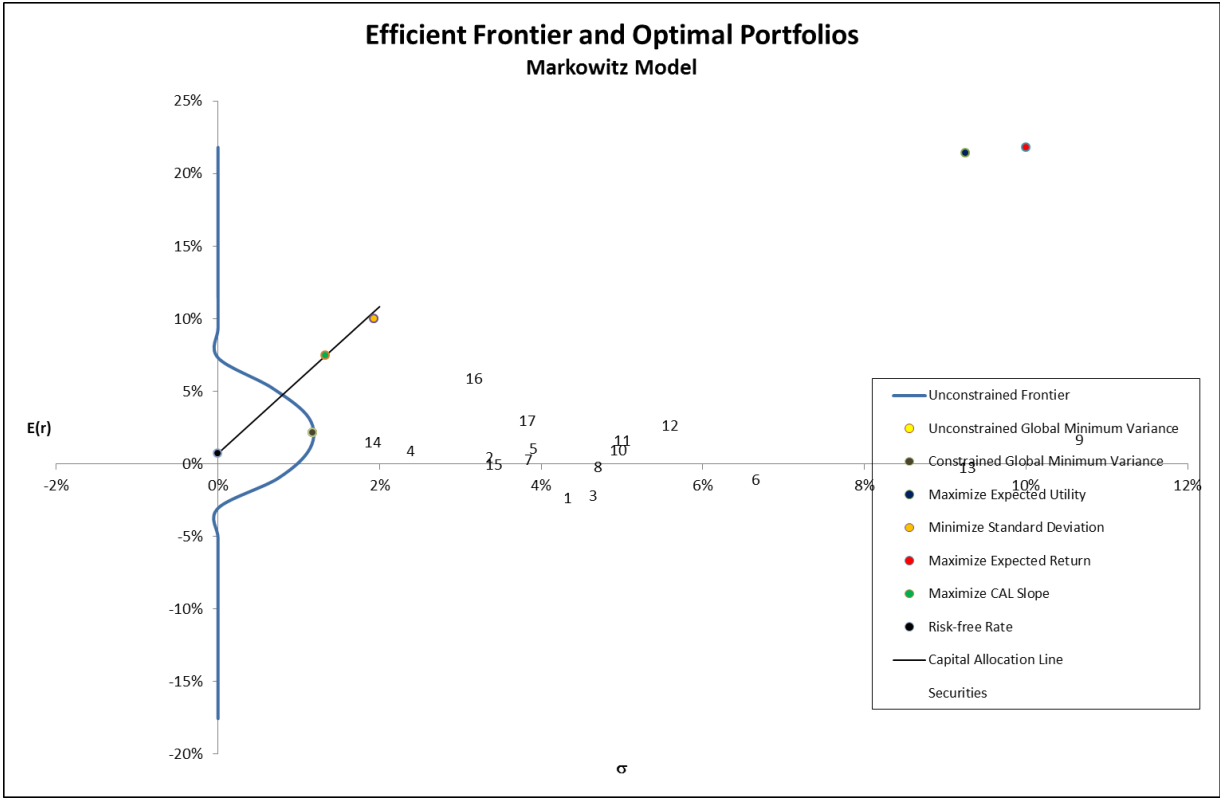


Figure 2: Formal Employment Scenario 1: Efficient Frontier

Industries	Scenario 1				Scenario 2				Scenario 3							
	Unconstrained Global Minimum Variance	Constrained Global Minimum Variance	Maximize Utility	Minimize Standard Deviation	Maximize Expected Return	Maximize Slope of the CAL	Constrained Global Minimum Variance	Maximize Utility	Minimize Standard Deviation	Maximize Expected Return	Maximize Slope of the CAL	Constrained Global Minimum Variance	Maximize Utility	Minimize Standard Deviation	Maximize Expected Return	Maximize Slope of the CAL
	Weights	Weights	Weights	Weights	Weights	Weights	Weights	Weights	Weights	Weights	Weights	Weights	Weights	Weights	Weights	Weights
1	5.53%	5.53%	-100.00%	-30.75%	-100.00%	-8.95%	0.00%	0.00%	0.00%	0.00%	0.00%	2.00%	2.00%	2.00%	2.00%	2.00%
2	0.46%	0.46%	-80.61%	-10.50%	-84.87%	9.72%	0.00%	0.00%	0.00%	0.00%	0.00%	2.00%	2.00%	2.00%	2.00%	2.00%
3	-4.44%	-4.44%	-100.00%	-100.00%	-100.00%	-100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	2.00%	2.00%	2.00%	2.00%	2.00%
4	20.92%	20.92%	-17.05%	7.41%	-3.53%	24.42%	22.80%	0.00%	22.80%	0.00%	0.00%	20.00%	2.00%	20.00%	2.00%	7.91%
5	-8.94%	-8.94%	100.00%	-19.77%	100.00%	-21.15%	0.00%	0.00%	0.00%	0.00%	0.00%	2.00%	2.00%	2.00%	2.00%	2.00%
6	-4.36%	-4.36%	-54.11%	-8.68%	-68.73%	-11.38%	0.00%	0.00%	0.00%	0.00%	0.00%	2.00%	2.00%	2.00%	2.00%	2.00%
7	12.75%	12.75%	-12.78%	23.59%	-19.56%	44.21%	0.00%	0.00%	0.00%	0.00%	0.00%	2.00%	2.00%	2.00%	2.00%	2.00%
8	-4.74%	-4.74%	-100.00%	-45.82%	-100.00%	-41.46%	0.00%	0.00%	0.00%	0.00%	0.00%	2.00%	2.00%	2.00%	2.00%	2.00%
9	-1.01%	-1.01%	25.90%	-1.06%	29.17%	-4.41%	0.00%	0.00%	0.00%	0.00%	0.00%	2.00%	2.00%	2.00%	2.00%	2.00%
10	-12.65%	-12.65%	48.60%	18.44%	58.45%	18.04%	0.00%	0.00%	0.00%	0.00%	0.00%	2.00%	2.00%	2.00%	2.00%	2.00%
11	-8.06%	-8.06%	100.00%	63.03%	100.00%	59.60%	0.00%	0.00%	0.00%	0.00%	0.00%	2.00%	2.00%	2.00%	2.00%	2.00%
12	-2.55%	-2.55%	100.00%	-2.33%	100.00%	-7.76%	3.34%	0.00%	3.34%	0.00%	21.59%	6.38%	20.00%	6.38%	20.00%	17.47%
13	3.07%	3.07%	-9.94%	-2.31%	-10.91%	-4.31%	0.00%	0.00%	0.00%	0.00%	0.00%	2.00%	2.00%	2.00%	2.00%	2.00%
14	43.82%	43.82%	100.00%	31.46%	100.00%	30.98%	30.09%	0.00%	30.09%	0.00%	0.00%	20.00%	14.00%	20.00%	2.00%	10.61%
15	25.67%	25.67%	-100.00%	70.67%	-100.00%	46.90%	14.94%	0.00%	14.94%	0.00%	0.00%	3.76%	2.00%	3.76%	2.00%	2.00%
16	21.58%	21.58%	100.00%	78.70%	100.00%	49.24%	14.12%	100.00%	14.12%	100.00%	57.96%	11.02%	20.00%	11.02%	20.00%	20.00%
17	12.95%	12.95%	100.00%	27.93%	100.00%	16.30%	14.70%	0.00%	14.70%	0.00%	20.45%	16.84%	20.00%	16.84%	20.00%	20.00%
$\sum w_i$	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
$E(r_i)$	2.13%	2.13%	21.43%	10.00%	21.82%	7.46%	2.02%	5.90%	2.02%	5.90%	4.62%	1.82%	2.56%	1.82%	2.58%	2.49%
σ_i	1.17%	1.17%	9.26%	1.93%	10.00%	1.33%	1.37%	3.17%	1.37%	3.17%	2.07%	1.70%	1.92%	1.70%	2.71%	1.84%
$E(U)$	0.0209	0.0209	0.1886	0.0989	0.1882	0.0741	0.0197	0.0560	0.0197	0.0560	0.0449	0.0173	0.0245	0.0173	0.0236	0.0239
Prob ($r < 0$)	3.51%	3.51%	1.03%	0.00%	1.46%	0.00%	7.03%	3.12%	7.03%	3.12%	1.28%	14.26%	9.12%	14.26%	17.10%	8.76%
Slope of the CAL	1.1971	1.1971	2.2371	4.8068	2.1095	5.0589	0.9482	1.6359	0.9482	1.6359	1.8849	0.6445	0.9573	0.6445	0.6847	0.9631

Table 3: Formal Employment: Model Outputs

5.3 Support for Industrial Capacity Development

Support for industrial capacity development can be measured through the real output data from Quantec. Reducing the data down to the specific SIC classifications which encapsulate the priority industries focuses the optimisation modelling to specific key industries which the IDC would like to develop.

Table 21: Real Output per Priority Industry highlights the value of real output generated per priority industry as categorised by the specific columns. Real output can be defined as the industries production, given input requirements. It essentially emphasises the development of specific industries if measured over time.

Table 23: Real Output Industry Contribution per Priority Industry characterises the relative size of real output, which each specific priority industry contributes to the overall industries real output value.

Table 24: Real Output Growth Rate per Priority Industry is calculated using equation 4.7 and illustrates the respective change in production output or industry growth experienced within each priority industry.

Table 22: Data Statistics for Real Output per Priority Industry and Table 25: Data Statistics for Real Output Growth Rate per Priority Industry provide key insights into the central tendency and spread from the mean of real output within the specific priority industries.

Furthermore, these tables illustrate the range and shape of the distribution for real output. Inferences can be drawn from the identification of specific priority industries which have opportunity for real output growth.

The table further facilitates the prioritisation process as the relative size of the priority sector needs to be accounted for when making capital allocation decisions. Excessive investment within an industry could have adverse effects and result in slower growth.

An example of the largest real output contributing priority industries in 2012 were Finance and Insurance contributing R797,320 million, which equates to a 19.26% contribution to priority industries real output. This is followed by Wholesale; Retail Trade; Hotels and Restaurants with R467,808 million, which equates to an 11.3% contribution to priority industries real output. The combined contribution of these two industries is 30.56% of the total real output of the priority industries. Comparatively, in 1975, the same industries contributed just 23.64%.

However, the relative contribution of Wholesale; Retail Trade; Hotels and Restaurants from 1975 to 2012 towards the priority industries has shrunk 0.88% from 12.18%. These two priority industries have a mean growth rate, for the period 1970 to 2012, of 4.41% and 3.44% respectively. These growth rates are above the industry average of 3.23% through the same time period.

When considering the 2012 growth rates, these priority industries are above their mean growth rates and are 4.44% and 4.58% respectively. This highlights that both these priority industries are growing above the industry average of 3.29%. When considering the formal employment growth rates for Wholesale; Retail Trade; Hotels and Restaurants over the same period 2012, it raises an interesting fact, specifically, that formal employment growth rate is below industry average while the real output is in excess of the industry average. This seems counter-intuitive, however, it does stress that correlation does not mean causation.

Figure 12: Real Output Graphs per Priority Industry as well as Figure 13: Real Output Growth Rate Graphs per Priority Industry are graphical representations of the data in Table 23 and Table 24. The graphs of Textiles and Wearing Apparel; Non-Metallic Minerals and Construction highlight that these three priority industries had relatively no normalised real output growth for almost twenty years from late 1970s to late 1990s. Electricity, Gas, Steam and Water Supply have suffered a declining growth from 1970 to 2012.

Table 25: The Correlation Matrix for Growth Rates of Real Output per Priority Industry is used in the Markowitz portfolio optimisation model for determining the optimal portfolio weights to maximise the growth rate for real output whilst minimising the relative risk, which is measured through the volatility of the growth rates. The set of minimum variance portfolios is represented by a parabolic curve as expressed in the efficiency frontier as outlined in Figure 1: The Efficient Frontier Example and Figures 3, 15 and 16 for Real Output under scenario 1, 2 and 3 respectively.

The key input assumptions used within each of the three scenarios for real outputs are outlined in Tables 4 and 5. The expected return is the mean of the growth rates per priority industry.

	All Scenarios
N Stocks	17
A	6.00
r_f	3.23%
Avg Corr	0.300793382

		Scenario 1	Scenario 2	Scenario 3
Exp Ret	Min	10%	0%	0%
	Max	20%	20%	10%
Std Dev	Min	6%	0%	0%
	Max	10%	20%	10%

Table 4: Real Output: Model Parameters

One of the key inputs for the Markowitz model is the risk-free rate. In order to ensure consistency, the industry mean real output growth rate was used across all scenarios. The expected growth rates which the model is bound to have a upper and lower limit of 10% and 20% for Scenario 1; 0% and 20% for Scenario 2 and 0% and 10% for Scenario 3. The upper and lower bound for risk is 6% and 10% for Scenario 1; 0% and 20% for Scenario 2 and 0% and 10% for Scenario 3.

Industries	Exp Ret	Std Dev	Scenario 1		Scenario 2		Scenario 3	
			Weight Limits		Weight Limits		Weight Limits	
			Min	Max	Min	Max	Min	Max
1	3.61%	9.58%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
2	3.12%	4.72%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
3	1.95%	6.90%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
4	3.06%	5.56%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
5	5.08%	6.26%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
6	1.93%	7.63%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
7	2.64%	6.57%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
8	4.57%	10.20%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
9	3.97%	13.48%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
10	4.10%	11.68%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
11	3.38%	9.72%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
12	4.02%	3.75%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
13	2.29%	6.24%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
14	3.44%	4.63%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
15	5.47%	5.34%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
16	4.41%	5.19%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
17	5.22%	4.71%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%

Table 5: Real Output: Model Inputs

The outcomes of the Markowitz model for real output, given the listed parameters, inputs, key drivers, bounds and priority industry growth rates, are outlined in the summary Table 6 for the respective scenarios.

When considering the model input variables, it's interesting to note that the standard deviation, which is the measure of volatility, for Electrical Machinery; Television, Radio and Communication Equipment; as well as Motor Vehicles, Parts and Accessories and Other Transport Equipment is in excess of 10%, which is out of line with the rest of the priority industries trends.

The ranking of the risk through weights between Scenario 2 and Scenario 3 is generally preserved when amending the constraints. Scenario 1 allows for divesting,

which significantly changes the ranking of risk. When considering minimising volatility of real output, Transport, Storage and Communication has the highest weighting in Scenario 1, however Transport, Storage and Communication does not feature in Scenario 2 or Scenario 3.

In Scenario 1, the expected growth rate of the optimised portfolio ranges up to 12.99% when maximising utility, and 5.35% and 4.61% in Scenario 2 and Scenario 3 respectively when maximising growth rate.

Real output behaves closer to expectations than formal employment does as the probability of negative growth rates is higher when trying to maximise growth rates relative to minimising the volatility of the portfolio.

Figure 3 below and Figures 14 and 15 in Annexure E are the efficient frontiers for scenarios 1, 2 and 3 respectively.

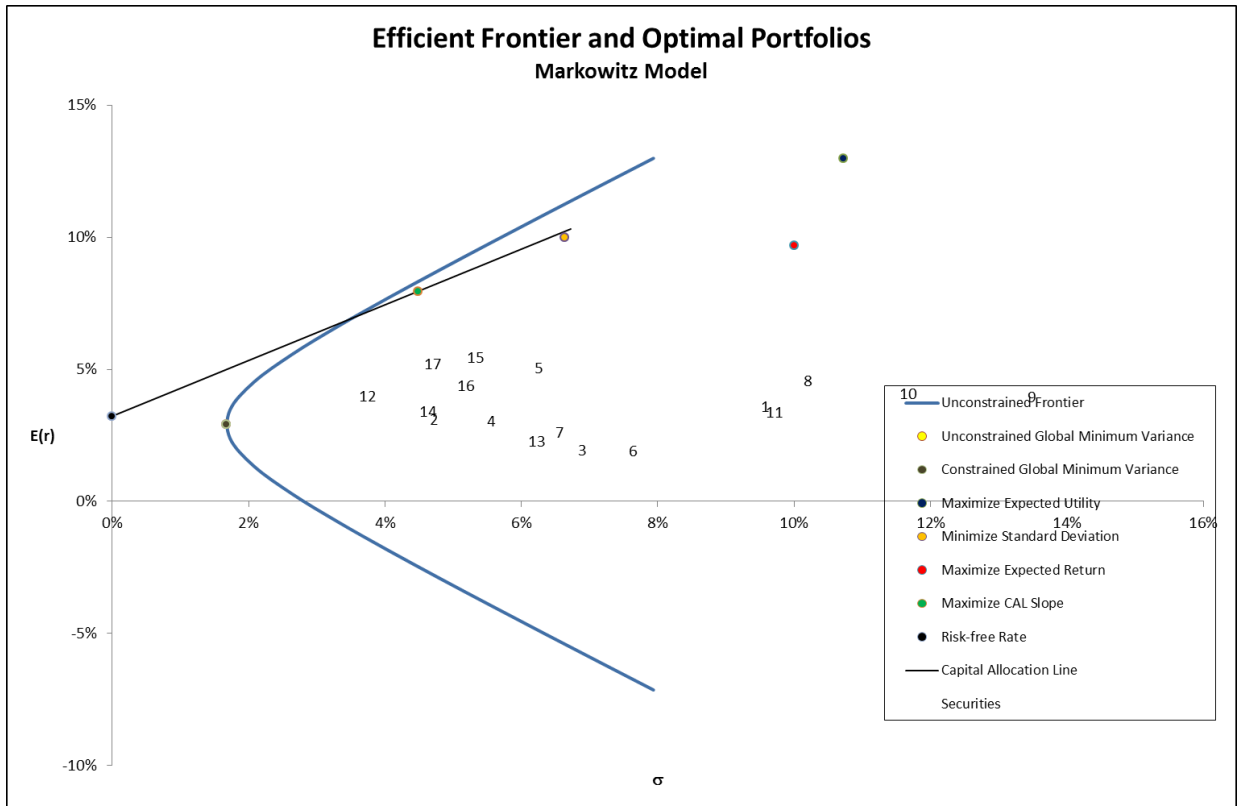


Figure 3: Real Output Scenario 1: Efficient Frontier

Industries	Scenario 1					Scenario 2					Scenario 3					
	Unconstrained Global Minimum Variance	Constrained Global Minimum Variance	Maximize Utility	Minimize Standard Deviation	Maximize Expected Return	Maximize Slope of the CAL	Constrained Global Minimum Variance	Maximize Utility	Minimize Standard Deviation	Maximize Expected Return	Maximize Slope of the CAL	Constrained Global Minimum Variance	Maximize Utility	Minimize Standard Deviation	Maximize Expected Return	Maximize Slope of the CAL
	Weights	Weights	Weights	Weights	Weights	Weights	Weights	Weights	Weights	Weights	Weights	Weights	Weights	Weights	Weights	Weights
1	1.59%	1.59%	10.55%	12.19%	24.01%	13.40%	5.48%	0.00%	5.48%	0.00%	0.00%	5.27%	2.00%	5.27%	2.00%	2.00%
2	42.71%	42.71%	-84.51%	-53.05%	-14.61%	-24.19%	25.07%	0.00%	25.07%	0.00%	0.00%	20.00%	2.00%	20.00%	2.00%	2.00%
3	34.23%	34.23%	-100.00%	-100.00%	-48.30%	-78.10%	0.00%	0.00%	0.00%	0.00%	0.00%	2.00%	2.00%	2.00%	2.00%	2.00%
4	-11.07%	-11.07%	-89.04%	-32.43%	-13.82%	-8.66%	0.00%	0.00%	0.00%	0.00%	0.00%	2.00%	2.00%	2.00%	2.00%	2.00%
5	11.57%	11.57%	99.23%	55.80%	51.27%	42.29%	0.00%	0.00%	0.00%	0.00%	0.00%	20.00%	20.00%	20.00%	20.00%	6.79%
6	-28.59%	-28.59%	68.54%	79.58%	-47.50%	60.93%	0.00%	0.00%	0.00%	0.00%	0.00%	2.00%	2.00%	2.00%	2.00%	2.00%
7	15.10%	15.10%	-100.00%	-74.83%	-26.16%	-44.84%	0.00%	0.00%	0.00%	0.00%	0.00%	2.00%	2.00%	2.00%	2.00%	2.00%
8	-29.11%	-29.11%	74.69%	59.86%	37.89%	36.66%	0.00%	0.00%	0.00%	0.00%	0.00%	2.00%	2.00%	2.00%	14.00%	2.00%
9	-5.04%	-5.04%	1.91%	7.60%	-4.47%	9.48%	0.00%	0.00%	0.00%	0.00%	0.00%	2.00%	2.00%	2.00%	2.00%	2.00%
10	8.67%	8.67%	-54.35%	-53.67%	23.10%	-39.55%	0.00%	0.00%	0.00%	0.00%	0.00%	2.00%	2.00%	2.00%	2.00%	2.00%
11	-1.88%	-1.88%	10.81%	10.52%	-3.17%	7.08%	0.00%	0.00%	0.00%	0.00%	0.00%	2.00%	2.00%	2.00%	2.00%	2.00%
12	33.38%	33.38%	100.00%	67.02%	15.94%	52.28%	30.15%	0.00%	30.15%	0.00%	18.62%	20.00%	2.00%	20.00%	2.00%	15.68%
13	0.28%	0.28%	-26.55%	5.68%	-38.86%	17.38%	6.57%	0.00%	6.57%	0.00%	0.00%	6.67%	2.00%	6.67%	2.00%	2.00%
14	29.46%	29.46%	-100.00%	-100.00%	-1.78%	-100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	2.00%	2.00%	2.00%	2.00%	2.00%
15	-30.27%	-30.27%	100.00%	100.00%	63.98%	77.14%	0.00%	53.03%	0.00%	100.00%	28.83%	2.00%	20.00%	2.00%	20.00%	20.00%
16	25.30%	25.30%	88.72%	39.74%	28.82%	22.55%	13.96%	0.00%	13.96%	0.00%	7.17%	7.74%	14.00%	7.74%	2.00%	13.53%
17	3.67%	3.67%	100.00%	76.01%	53.66%	56.16%	18.77%	46.97%	18.77%	0.00%	45.39%	18.32%	20.00%	18.32%	20.00%	20.00%
Σw_i	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
$E(r_i)$	2.93%	2.93%	12.99%	10.00%	9.70%	7.95%	3.94%	5.35%	3.94%	5.47%	5.01%	3.86%	4.61%	3.86%	4.63%	4.47%
σ_i	1.68%	1.68%	10.72%	6.63%	10.00%	4.48%	2.30%	4.17%	2.30%	5.34%	3.42%	2.79%	3.89%	2.79%	4.58%	3.42%
$E(U)$	0.0284	0.0284	0.0954	0.0868	0.0670	0.0735	0.0378	0.0483	0.0378	0.0461	0.0466	0.0363	0.0416	0.0363	0.0400	0.0412
Prob ($r < 0$)	4.04%	4.04%	11.28%	6.58%	16.61%	3.80%	4.35%	9.95%	4.35%	15.28%	7.18%	8.31%	11.78%	8.31%	15.59%	9.56%
Slope of the CAL	-0.1804	-0.1804	0.9107	1.0210	0.6470	1.0539	0.3074	0.5093	0.3074	0.4196	0.5198	0.2260	0.3557	0.2260	0.3064	0.3628

Table 6: Real Output: Model Outputs

5.4 Portfolio Optimisation

Taking into account the previous two strategic variables, the next step would be to combine the variable to create a single optimised portfolio. There is a fundamental argument which arises when determining or deciding what the weightings between the strategic variables should be as it is not possible to maximise on an unknown.

Therefore, the priority order between strategic variables is based, quite literally, on a strategy. If the strategy is to drive down unemployment, then larger emphasis should be placed on job creation. If, however, the strategy is to drive economic development through increasing production capacity and real output, then a larger emphasis should be placed on support for industrial capacity development.

As it stands, the IDC has a strategic objective of prioritising job creation and, secondly, supporting industrial capacity development. Table 7 below highlights the normalised weighting allocation, used by the IDC, for the two strategic objectives. These are the weighting when considered in isolation from the other four strategic objectives of the IDC.

Job Creation	67.57%
Support for Industrial Capacity Development	32.43%
	<u>100.00%</u>

Table 7: Normalised Weighting Allocation

The growth rates of formal employment and real output were weighted and combined into a new growth rate variable. This variable is highlighted in Table 27: Optimised Portfolio Growth Rate per Priority Industry.

The combined growth rate variable is technically a 'nonsensical' variable when trying to tie it back to a specific objective. In other words, the growth rate of 3.28% in 2012 for Other Services does not speak directly to how it will be achieved or measured. When considering the actual formal employment growth, it is 0.44% while real output

growth was 9.2%. Therefore, incorrect inference could be drawn from the information if it is taken out of context and not used in collaboration with underlying variables' specific data and features. In financial application, the combination of financial assets in portfolio optimisation creates a measurable and 'sensible' combined variable, which are mainly financial returns on the underlying portfolio of assets. Understanding this concept is critical when interpreting the models results.

The primary benefit of the combination is that industries which experience rapid real output growth with little to no employment growth are normalised. An example of when these types of scenarios occurred is the Dot-com boom in the 1990s. Small companies grew into multi-million dollar companies with little to no growth in the number of formally employed people within the sector. Consequently, understanding the market dynamics is critical when deriving capital allocation decisions.

The data statistics and correlation matrix is given in Table 28: Data Statistics for Optimised Portfolio Growth Rate per Priority Industry and Table 29: Correlation Matrix for Growth Rates of the Optimised Portfolio per Priority Industry respectively.

Figure 17: Optimised Portfolio Growth Rate Graphs per Priority Industry are graphical representations of the data in Table 27.

The correlation matrix, Table 29, is used in the Markowitz portfolio optimisation model for determining the optimal portfolio weights to maximise the growth rate combination of formal employment (with a weighting of 67.57%) and real output (with a weighting of 32.43%). The model will attempt to minimise the relative risk whilst maximising the expected growth rate. The set of minimum variance portfolios is represented by a parabolic curve as expressed in the efficiency frontier as outlined in Figure 1: The Efficient Frontier Example and Figures 4, 19 and 20 for Optimised Portfolio under scenario 1, 2 and 3 respectively.

The key parameters inputs which are used within each of the three scenarios are outlined in Tables 8 and 9. The expected return is the mean of the combined growth rates per priority industry.

	All Scenarios
N Stocks	17
A	6.00
r _f	1.53%
Avg Corr	0.340738562

		Scenario 1	Scenario 2	Scenario 3
Exp Ret	Min	10%	0%	0%
	Max	20%	20%	10%
Std Dev	Min	6%	0%	0%
	Max	10%	20%	10%

Table 8: Optimised Portfolio: Model Parameters

Industries	Exp Ret	Std Dev	Scenario 1		Scenario 2		Scenario 3	
			Weight Limits		Weight Limits		Weight Limits	
			Min	Max	Min	Max	Min	Max
1	-0.41%	4.18%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
2	1.32%	2.94%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
3	-0.83%	4.41%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
4	1.60%	2.77%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
5	2.38%	3.53%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
6	-0.08%	5.94%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
7	1.08%	4.01%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
8	1.38%	5.39%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
9	2.44%	9.15%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
10	2.00%	6.30%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
11	2.19%	4.88%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
12	3.13%	4.33%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
13	0.60%	7.24%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
14	2.13%	2.31%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
15	1.76%	2.92%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
16	5.42%	2.64%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%
17	3.73%	2.97%	-100.00%	100.00%	0.00%	100.00%	2.00%	20.00%

Table 9: Optimised Portfolio: Model Inputs

One of the key inputs for the Markowitz model is the risk-free rate. In order to ensure consistency, the industry mean combined growth rate, which was 1.53%, was used across all three scenarios. The expected growth rates which the model is bound to have a upper and lower limit of 10% and 20% for Scenario 1; 0% and 20% for Scenario 2 and 0% and 10% for Scenario 3. The upper and lower bound for risk is 6% and 10% for Scenario 1; 0% and 20% for Scenario 2 and 0% and 10% for Scenario 3.

The outcomes of the Markowitz model for the combined portfolio, given the listed assumptions, key drivers, bounds and priority industry growth rates are outlined in the summary Table 10 for the respective scenarios.

When comparing the scenario outputs, a clear trend emerges, namely that: the current capital allocation of the IDC is not optimised.

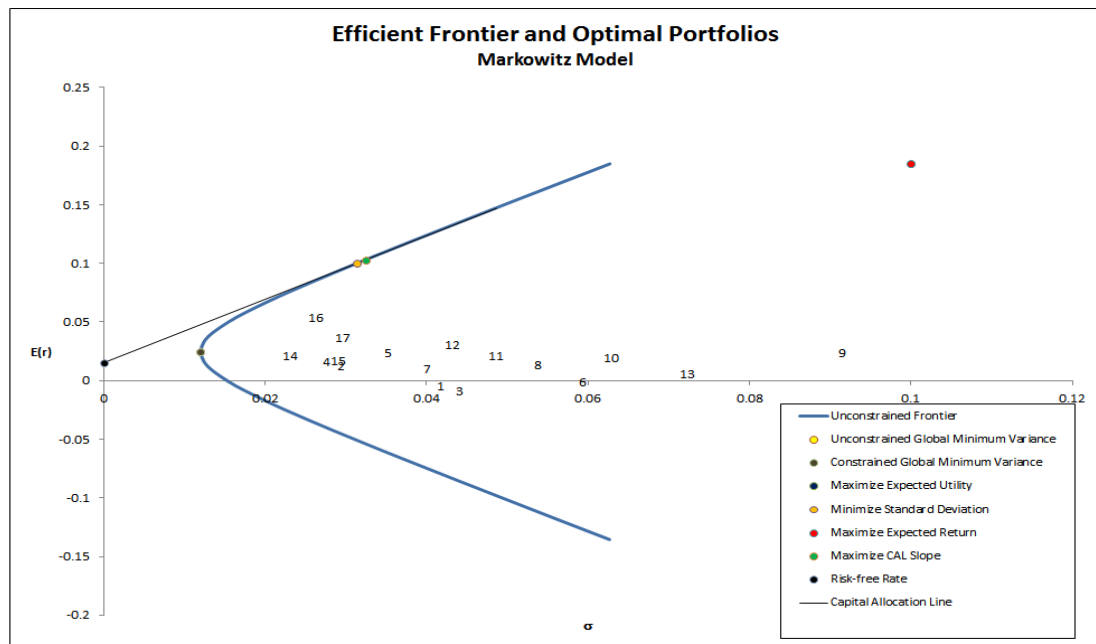


Figure 4: Optimised Portfolio Scenario 1: Efficient Frontier

It is clearly seen that the efficient frontier in Figure 4 for Scenario 1 allows for divesting and reallocation of capital to other priority industries which would better

utilise the capital funding to drive the objects of the IDC. Scenario 1 highlights a need to divest from the following priority industries:

- Agriculture, Forestry and Fishing;
- Food;
- Textiles and Wearing Apparel;
- Paper and Paper Products; Printing, Publishing and Recorded Media;
- Non-Metallic Minerals;
- Basic Iron and Steel; Metal Products excluding Machinery; Machinery and Equipment; and
- Electrical Machinery.

While reinvesting divested capital funding as well as new funding into the following priority industries:

- Coke, refined petroleum; basic and other chemicals; man-made fibres; plastic products;
- Furniture and other industries;
- Electricity, gas and steam; water supply;
- Transport and storage; communication;
- Finance and insurance; and
- Other services.

Scenario 3 does not allow for divesting and reallocation of capital to other priority industries, and makes provisions for a minimum of new capital allocation of 2%

of total capital allocation per priority industry, and up to a maximum of 20%. Scenario 3 prioritises the following industries

- Finance and insurance;
- Other services; and
- Food.

If the objective is to understand what the impact of the various optimised portfolio combinations would realise when referring back to the primary objectives, then the identified priority industries respective growth rates, both the formal employment and real output, should be taken and multiplied with their respective weightings as per the Markowitz optimised portfolio model weighting.

The resulting values should be multiplied by the intended new capital investment value. The injection of new capital funding should result in the expected growth rates per objective. This can be compared to the strategic objectives to ensure for final validation.

When comparing the IDC's approved application data for capital financing between 2010 and 2014 for the same priority industries, relative to the optimum portfolio as derived in Scenario 3, the following stands out:

- Under-investment in the following priority industries:
 - Television, radio and communication equipment;
 - Finance and insurance; and
 - Other services.
- Over-investment in the following priority industries:

- Basic iron and steel; metal products excluding machinery; machinery and equipment; and
- Electricity, gas and steam; water supply.

Notwithstanding the aforementioned, the IDC has a large concentration risk for approved applications within the Electricity, Gas, Steam and Water supply priority sector. The proportion of total capital funding approved for capital funding over the period 2010 to 2014 is 47.2%. This priority industry only contributed 0.6% of the formal employment within South Africa for 2012.

A complete summary outlining the comparison is given in Table 30: Optimum Portfolio (Scenario 3) Comparison to IDC Approved Application Data (2010-2014) as well as Table 30: Difference from the Markowitz Optimum Portfolio (Scenario 3) and IDC Approved Applications (2010-2014).

In Figure 5 below, any value exceeding 0 is over commitment of capital per industry, whilst any value under 0 is under investment within the specific priority industry.

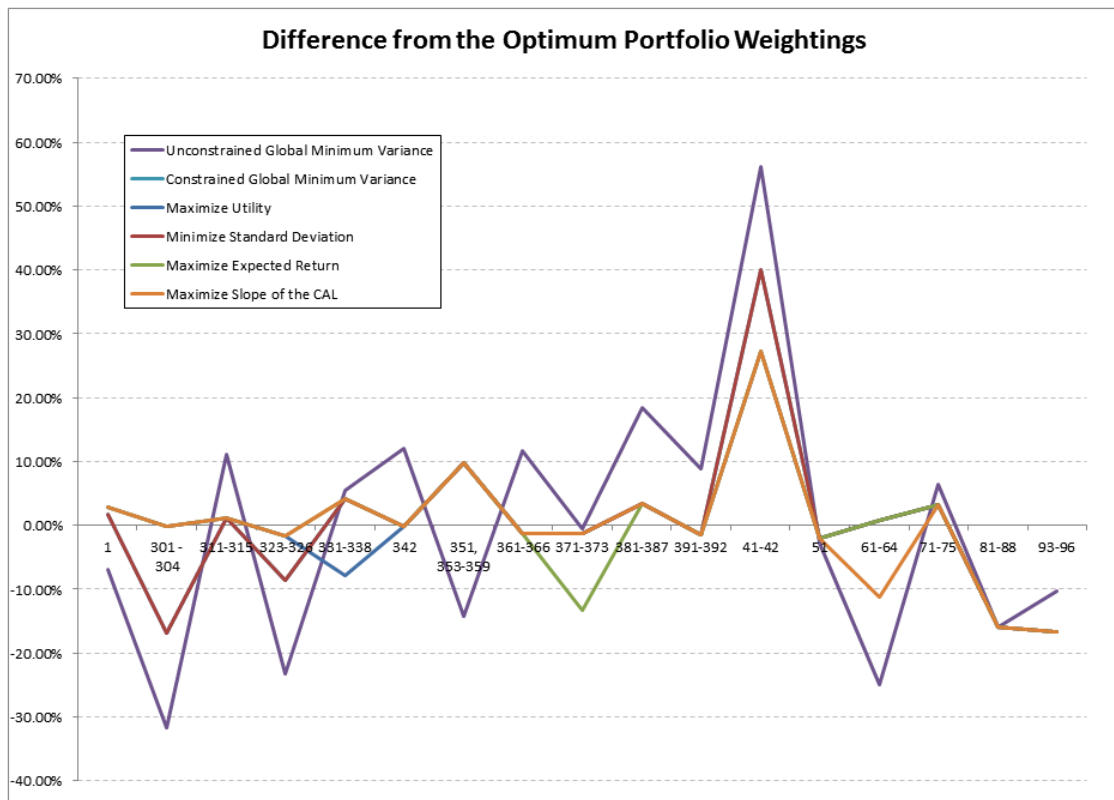


Figure 5: Difference from the Markowitz Optimum Portfolio (Scenario 3) and IDC Approved Applications (2010-2014)

Industries	Unconstrained Global Minimum Variance Weights	Scenario 1				Scenario 2				Scenario 3						
		Constrained Global Minimum Variance Weights	Maximize Utility Weights	Minimize Standard Deviation Weights	Maximize Expected Return Weights	Maximize Slope of the CAL Weights	Constrained Global Minimum Variance Weights	Maximize Utility Weights	Minimize Standard Deviation Weights	Maximize Expected Return Weights	Maximize Slope of the CAL Weights	Constrained Global Minimum Variance Weights	Maximize Utility Weights	Minimize Standard Deviation Weights	Maximize Expected Return Weights	Maximize Slope of the CAL Weights
1	11.65%	11.65%	-100.00%	-39.80%	-100.00%	-41.81%	3.48%	0.00%	3.48%	0.00%	0.00%	3.06%	2.00%	3.06%	2.00%	2.00%
2	33.59%	33.59%	-100.00%	-48.57%	-100.00%	-53.00%	22.14%	0.00%	22.14%	0.00%	0.00%	18.71%	2.00%	18.71%	2.00%	2.00%
3	-7.87%	-7.87%	-100.00%	-47.04%	-100.00%	-49.97%	0.00%	0.00%	0.00%	0.00%	0.00%	2.00%	2.00%	2.00%	2.00%	2.00%
4	23.68%	23.68%	-100.00%	-38.51%	-100.00%	-40.74%	10.14%	0.00%	10.14%	0.00%	0.00%	8.94%	2.00%	8.94%	2.00%	2.00%
5	0.64%	0.64%	100.00%	-13.58%	100.00%	-14.64%	0.00%	0.00%	0.00%	0.00%	0.00%	2.00%	14.00%	2.00%	2.00%	2.00%
6	-10.29%	-10.29%	84.22%	20.30%	-82.86%	21.71%	0.00%	0.00%	0.00%	0.00%	0.00%	2.00%	2.00%	2.00%	2.00%	2.00%
7	26.04%	26.04%	-87.09%	-35.19%	-90.58%	-36.83%	0.00%	0.00%	0.00%	0.00%	0.00%	2.00%	2.00%	2.00%	2.00%	2.00%
8	-11.00%	-11.00%	-72.84%	-2.96%	-71.75%	-1.59%	0.00%	0.00%	0.00%	0.00%	0.00%	2.00%	2.00%	2.00%	2.00%	2.00%
9	1.22%	1.22%	40.98%	10.37%	40.65%	10.45%	0.00%	0.00%	0.00%	0.00%	0.00%	2.00%	2.00%	2.00%	14.00%	2.00%
10	-13.01%	-13.01%	27.64%	0.80%	28.34%	1.26%	0.00%	0.00%	0.00%	0.00%	0.00%	2.00%	2.00%	2.00%	2.00%	2.00%
11	-8.35%	-8.35%	100.00%	33.09%	100.00%	36.33%	0.00%	0.00%	0.00%	0.00%	0.00%	2.00%	2.00%	2.00%	2.00%	2.00%
12	-9.01%	-9.01%	100.00%	62.41%	100.00%	68.07%	13.38%	0.00%	13.38%	0.00%	21.90%	7.28%	20.00%	7.28%	20.00%	20.00%
13	2.81%	2.81%	-19.17%	-5.67%	-19.42%	-6.55%	0.00%	0.00%	0.00%	0.00%	0.00%	2.00%	2.00%	2.00%	2.00%	2.00%
14	27.68%	27.68%	94.70%	-47.09%	95.63%	-50.88%	0.00%	0.00%	0.00%	0.00%	0.00%	2.00%	2.00%	2.00%	2.00%	14.00%
15	-1.37%	-1.37%	100.00%	76.29%	100.00%	77.55%	0.44%	0.00%	0.44%	0.00%	0.00%	2.00%	2.00%	2.00%	2.00%	2.00%
16	19.98%	19.98%	100.00%	100.00%	100.00%	100.00%	21.89%	100.00%	21.89%	100.00%	55.19%	20.00%	20.00%	20.00%	20.00%	20.00%
17	13.59%	13.59%	100.00%	75.15%	100.00%	80.65%	28.54%	0.00%	28.54%	0.00%	22.91%	20.00%	20.00%	20.00%	20.00%	20.00%
Σw_i	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
$E(r_f)$	2.47%	2.47%	18.49%	10.00%	18.49%	10.31%	3.12%	5.42%	3.12%	5.42%	4.53%	2.74%	3.09%	2.74%	3.10%	3.06%
σ_f	1.20%	1.20%	10.00%	3.13%	10.00%	3.25%	1.47%	2.64%	1.47%	2.64%	1.78%	1.76%	1.95%	1.76%	2.41%	1.86%
$E(U)$	0.0243	0.0243	0.1549	0.0971	0.1549	0.1000	0.0305	0.0521	0.0305	0.0521	0.0443	0.0264	0.0298	0.0264	0.0292	0.0296
Prob ($r < 0$)	1.94%	1.94%	3.22%	0.07%	3.22%	0.07%	1.68%	2.00%	1.68%	2.00%	0.54%	5.98%	5.69%	5.98%	9.93%	5.03%
Slope of the CAL	0.7878	0.7878	1.6963	2.7052	1.6962	2.7065	1.0812	1.4735	1.0812	1.4735	1.6869	0.6861	0.7982	0.6861	0.6506	0.8210

Table 10: Optimised Portfolio: Model Outputs

Chapter 6

Conclusion

6.1 Aim of this Study

The study aims to understand the key focus areas of the South African government, as positioned through their respective policies, and how the IDC utilises its capital in order to achieve these strategic objectives. This study focuses on delivering the following key objectives:

- i. Determining an objective approach to understanding the implementation of capital investment decisions and comparing those to an optimised portfolio, given the key focus areas of the government;
- ii. Supporting the adaption of currently utilised methodologies and deriving changes for prospective approaches to investment decisions within DFIs, of which the IDC is among the largest in Africa;
- iii. Supporting the objective of the sustainable economic growth framework by contrasting the objectives of the IDC with the actual capital investment decisions made;
- iv. Introducing an analytical framework and modelling methodology for portfolio optimisation, where the key drivers are non-conventional sustainable economic development and economic empowerment;
- v. Identifying means to maximise utility of capital investments to drive effective delivery of strategic objectives as outlined in the vision and mission of the IDC.

6.2 Results

The outlined aims of the study were to understand the key focus areas of the South African government, as positioned through their respective policies. The key government policies are:

- The New Growth Path (NGP)

The NGP framework is aimed at achieving the targets and objectives of the South African Government through regulatory reforms; building an integrated African economy; and partnerships between government, private sector and the public.

- National Development Plan 2030

The National Development Plan 2030 is a key policy which sets the goals, visions and identifies critical development areas within South Africa. This policy is essentially the framework around which the New Growth Path and Industrial Policy Action Plan is built.

- Industrial Policy Action Plan (IPAP) 2014 to 2016

IPAP 2013 through its various iterations has sought to achieve key objectives through DFIs such as the IDC. These key objectives are: enabling and strengthening the internal alignment and co-ordination between the Department of Trade and Industry divisions responsible for important related work. These projects include industrial development; trade policy; investment and export promotion; incentive support and enterprise development.

- IDC strategic objectives as identified by the executives of the IDC

The core focus of the IDC is sustainable economic development through concerted investments within the fundamental industries, which drive growth and employment within the economy.

The current capital allocation methodology utilised by the IDC is primarily focused on management rationale and strategic objectives. Markowitz (1987) presents procedures, processes and systems of algorithms for solving portfolio selection problems through both the expected value (mean) and variance of portfolio returns when choosing the underlying assets within the portfolio. Supporting the adaption of currently utilised methodologies, such as the MMVT, within the IDC and driving potential changes for prospective approaches to investment decisions. Investment decisions by the IDC are extremely important; not only from a strategic objective perspective, but also from a limit resource point of view as effective portfolio selection plays a key role in achieving the goals of the IDC. The two primary objectives of the IDC were used in developing a model for capital allocation, namely:

- i. Job creation

The degree to which an investment by the IDC would contribute towards job creation in the country; and

- ii. Support for industrial capacity development

Determined by whether a firm is operating in one of the industries listed on the industry or sector priority list. It is applicable if the firm operates in one of the government's priority industries, and it measures the IDC's financial support for industries identified as being of high importance to the country.

The essence of the MMVT is to choose the weighting factors of the portfolio in an optimal way. An optimal set of weights is classified as one where the portfolio achieves an acceptable expected rate of return with minimal volatility. Portfolios situated along the efficient frontier line represent the most “optimal” portfolio.

The growth rates of formal employment and real output were weighted and combined into a new growth rate variable. The outcomes of the Markowitz model for the combined portfolio, given the listed assumptions, key drivers, bounds and priority industry growth rates was outlined in the summary Tables 10 for the respective scenarios.

Results found that the current capital allocation of the IDC is not optimised. The IDC has a large concentration risk for approved applications within the Electricity, Gas, Steam and Water supply priority sector. The proportion of total capital approved for capital funding in this sector between the period of 2010 to 2014 is 47.2%, while this priority industry only contributed 0.6% of the formal employment within South Africa for 2012.

In order to attain an optimal portfolio, the IDC should strive for portfolio selection criteria as outlined in scenario 3 for the optimal portfolio, using Markowitz (1987). The key benefits of driving this methodology are a minimum guaranteed capital investment is all the identified priority industries, namely 2%. Furthermore, concentration risk is accounted for as the maximum allowance for capital investment within any identified priority industries is limited to 20%. Alternative minima and maxima boundary values could be used, depending on the strategic objective, which are predisposed to changes from time to time. Optimising portfolio selection within these or other predefined constraints, allows for an analytical approach to maximising strategic objectives, in this case creation of employment and real output growth.

6.3 Short Comings of the Study and Future Research Recommendations

The optimal portfolio can be refined through the inclusion of the remaining four key objectives of the IDC, namely:

- i. Support for entrepreneurs;
- ii. Support for B-BBEE;
- iii. Support for regional development; and
- iv. Promoting environmental sustainability.

The optimal portfolio can be further refined through the use of industry micro-level SIC data (level 4 and 5). The same methodology which was developed in this research paper can be used to develop a more granular optimal portfolio.

Annexure A.

South African Government National Development Plan - 2030

The following is a verbatim extract from <http://www.gov.za/issues/national-development-plan/development-plan-2012.html>

A.1 National Development Plan 2030

The National Development Plan is a plan for the country to eliminate poverty and reduce inequality by 2030 through uniting South Africans, unleashing the energies of its citizens, growing an inclusive economy, building capabilities, enhancing the capability of the state and leaders working together to solve complex problems.

President Jacob Zuma appointed the National Planning Commission (NPC) in May 2010 to draft a vision and national development plan for consideration by cabinet and the country. The NPC is an advisory body consisting of 26 people drawn largely from outside government.

After releasing a draft plan in November 2011, the NPC held extensive consultations with South Africans, including government, unions, academics, industry bodies, non-profit organisations, religious associations and the general public. The response was overwhelmingly positive and the inputs have helped to strengthen the proposals made in the plan.

The Plan in Brief

A.1.1 High-level objectives to be achieved by 2030

- Reduce the number of people who live in households with a monthly income below R419 per person (in 2009 prices) from 39 percent to zero percent.
- Reduce inequality, as measured by the Gini coefficient, from 0.69 to 0.6.

To make meaningful progress in eliminating poverty and reducing inequality, South Africa needs to write a new story. The National Planning Commission envisions a South Africa where opportunity is determined not by birth, but by ability, education and hard work. Above all, we need to improve the quality of education and ensure that more people are working. We need to make the most of all our people, their goodwill, skills and resources. This will spark a cycle of development that expands opportunities, builds capabilities and raises living standards. We cannot continue with business as usual. We need to change the way we do things; the sooner we do this, the better.

A.1.2 Enabling milestones

- Increase employment from 13 million in 2010 to 24 million in 2030.
- Raise per capita income from R50 000 in 2010 to R120 000 by 2030.
- Increase the share of national income of the bottom 40 percent from 6 percent to 10 percent.
- Establish a competitive base of infrastructure, human resources and regulatory frameworks.
- Ensure that skilled, technical, professional and managerial posts better reflect the country's racial, gender and disability makeup.
- Broaden ownership of assets to historically disadvantaged groups.
- Increase the quality of education so that all children have at least two years of preschool education and all children in grade 3 can read and write.

- Provide affordable access to quality health care while promoting health and wellbeing.
- Establish effective, safe and affordable public transport.
- Produce sufficient energy to support industry at competitive prices, ensuring access for poor households, while reducing carbon emissions per unit of power by about one-third.
- Ensure that all South Africans have access to clean running water in their homes.
- Make high-speed broadband internet universally available at competitive prices.
- Realise a food trade surplus, with one-third produced by small-scale farmers or households.
- Ensure household food and nutrition security.
- Entrench a social security system covering all working people, with social protection for the poor and other groups in need, such as children and people with disabilities.
- Realise a developmental, capable and ethical state that treats citizens with dignity.
- Ensure that all people live safely, with an independent and fair criminal justice system.
- Broaden social cohesion and unity while redressing the inequities of the past.
- Play a leading role in continental development, economic integration and human rights.

A.1.3 Critical actions

- A.1.3.1 A social compact to reduce poverty and inequality, and raise employment and investment.
- A.1.3.2 A strategy to address poverty and its impacts by broadening access to employment, strengthening the social wage, improving public transport and raising rural incomes.
- A.1.3.3 Steps by the state to professionalise the public service, strengthen accountability, improve coordination and prosecute corruption.
- A.1.3.4 Boost private investment in labour-intensive areas, competitiveness and exports, with adjustments to lower the risk of hiring younger workers.
- A.1.3.5 An education accountability chain, with lines of responsibility from state to classroom.
- A.1.3.6 Phase in national health insurance, with a focus on upgrading public health facilities, producing more health professionals and reducing the relative cost of private health care.
- A.1.3.7 Public infrastructure investment at 10 percent of gross domestic product (GDP), financed through tariffs, public-private partnerships, taxes and loans and focused on transport, energy and water.
- A.1.3.8 Interventions to ensure environmental sustainability and resilience to future shocks.
- A.1.3.9 New spatial norms and standards – densifying cities, improving transport, locating jobs where people live, upgrading informal settlements and fixing housing market gaps.
- A.1.3.10 Reduce crime by strengthening criminal justice and improving community environments.

A.1.4 Building a future for South Africa's youth

South Africa has an urbanising, youthful population. This presents an opportunity to boost economic growth, increase employment and reduce poverty. The Commission, recognising that young people bear the brunt of unemployment, adopted a "youth lens" in preparing its proposals, which include:

- A nutrition intervention for pregnant women and young children.
- Universal access to two years of early childhood development.
- Improve the school system, including increasing the number of students achieving above 50 percent in literacy and mathematics, increasing learner retention rates to 90 percent and bolstering teacher training.
- Strengthen youth service programmes and introduce new, community-based programmes to offer young people life-skills training, entrepreneurship training and opportunities to participate in community development programmes.
- Strengthen and expand the number of further education and training (FET) colleges to increase the participation rate to 25 percent.
- Increase the graduation rate of FET colleges to 75 percent.
- Provide full funding assistance covering tuition, books, accommodation and living allowance to students from poor families.
- Develop community safety centres to prevent crime and include youth in these initiatives.
- A tax incentive to employers to reduce the initial cost of hiring young labour-market entrants.
- A subsidy to the placement sector to identify, prepare and place matric graduates into work. The subsidy will be paid upon successful placement.

- Expand learnerships and make training vouchers directly available to job seekers.
- A formalised graduate recruitment scheme for the public service to attract highly skilled people.
- Expand the role of state-owned enterprises in training artisans and technical professionals.

As a country, progress has been substantial and our history provides many examples of South African coming together to achieve amazing things: our democratic transition, our constitution, and regular and credible elections.

We still have a lot to do if we are to move towards the inclusive and just society envisaged in our constitution by 2030. Fortunately, the challenges that confront us are not insurmountable.

The success of this plan will be judged by its ability to change relationships among people, within families, between people and the state and within the state itself. The plan is about bringing about transformation - to achieve a virtuous cycle of confidence and trust, a growing economy and expanding opportunities.

To achieve our vision, each South African must make a contribution. Active citizenry requires showing inspirational leadership at all levels of society. Leaders should mobilise community's to take charge of their future, raise grievances and assume responsibility for ensuring outcomes achieved.

A.1.5 Elements of a decent standard of living

Income, through employment or social security, is critical to defining living standards, but human beings need more than income. They need adequate nutrition, they need transport to get to work, and they desire safe communities

and clean neighbourhoods. These elements require action either from individuals, government, communities or the private sector.

The National Development Plan makes a firm commitment to achieving a minimum standard of living which can be progressively realised through a multi-pronged strategy. In the plan, we do not define that minimum standard of living but we do provide a framework for the adoption of a minimum standard of living by society. This approach is consistent with the Commission's view that the achievement of such a floor would require support and participation from all social partners and hence its definition is left for ongoing work of the Commission.

A.1.6 Going forward

In the remainder of its five-year term, the Commission will raise awareness of the plan among stakeholders, drive a long-term research agenda and advise government and society on the implementation of the plan. We will also work with the Department of Performance Monitoring and Evaluation to monitor the implementation of the plan.

Annexure B.

Policy Context for IPAP

The following is a verbatim from the Key Extracts from IPAP 2013. (Department of Trade and Industry, Republic of South Africa, 2013).

B.1 The Role of Manufacturing

South Africa's long-term vision of an equitable society is provided by the National Development Plan. The IPAP is informed by this vision and is both framed by and constitutes a key pillar of the programmatic perspectives set out in a series of 'drivers' and 'packages' contained in the NGP.

Government policy set out in these and other documents seeks to ensure a restructuring of the economy to set it on a more value-adding, labour-intensive and environmentally sustainable growth path.

Principal among the more specific policies is the National Industrial Policy Framework (NIPF) of the Department of Trade and Industry, which has the following key objectives:

- To promote diversification beyond the economy's current reliance on traditional and non-tradable services via the promotion of value-addition, characterised particularly by the movement into non-traditional tradable goods and services that can compete effectively in export markets and against imports.

- To promote a labour-absorbing industrialisation path, with the emphasis on tradable labour-absorbing goods and services and the systematic building of economic linkages that create employment.
- To promote industrialisation characterised by increasing participation of historically disadvantaged people and marginalised regions in the industrial economy.
- To contribute towards industrial development in Africa, with a strong emphasis on building the continent's productive capacity and securing deeper regional economic integration.
- To ensure the long-term intensification of South Africa's industrialisation process and movement towards a knowledge economy.

Sustainable long-term development should be underpinned by higher growth, exports and labour-intensive, value-adding economic activity in the production sectors, led by manufacturing. It is widely and increasingly acknowledged that manufacturing should play the critical role in this adjusted model of economic development. The economy is not made up of a set of discrete and isolated activities, but a range of primary and secondary sectors that are fundamentally interlinked and mutually supportive, requiring carefully calibrated, interlocking interventions. This approach is particularly relevant to a resource-rich economy such as South Africa's where:

- Manufacturing has substantial direct employment-creation potential and is the engine of rising per capita income and employment through its stimulation of the rest of the economy. Rising per capita incomes are particularly important for sustained growth and employment creation in the consumption-driven service sectors of the economy, which have become critically dependent on unsustainable levels of household debt. This impacts acutely on women, particularly the working-class and poor urban and rural women. In this regard, the expansion of manufacturing employment can play a significant role in

bringing more women, both urban and rural, into the formal workforce and, in particular, providing rural women with access to expanded employment opportunities in the agro-processing and crafts sectors.

- Manufacturing is central to South Africa's export strategy, based on value-added, labour-intensive tradable products that generate revenues that have a significant, positive impact on the balance of trade.
- Manufacturing plays a critical and indispensable role as a driver of innovation and productivity growth.
- Manufacturing must increasingly provide machinery and other inputs for the infrastructure build programme, which is central to South Africa's growth strategy and, more generally, into Public Goods, including Transport, Health, Education and Housing.
- An enhanced role for manufacturing in providing these inputs to the infrastructure programme will be critical in reducing its dependence on imports and mitigating wider vulnerabilities, particularly on the balance of trade.
- The evolution and strengthening of manufacturing should be organically linked to the development of an energy-efficient, less carbon-intensive growth strategy designed to limit wasteful resource consumption and mitigate the impact of economic development on the environment.

The NIPF and successive IPAPs have consistently made the point that manufacturing has a vital role to play in dynamising employment and growth in the economy. It has also been stressed that industrial policy should be framed and driven by a particular focus on value-adding sectors that embody a combination of relatively high employment and growth multipliers.

As measured through backward linkages, manufacturing sectors 'pull through' inputs from primary and other manufacturing and services sectors and transform them

into high-value products, stimulating employment along the entire value chain. These sectors provide an additional impetus to employment and growth through forward linkages to 'downstream' sectors, predominantly in services. Manufacturing companies depend upon service providers for production in IT, financial services, travel, security and so forth. In this sense, manufacturing 'creates demand' for services inputs and should play an increasingly central dynamising role in the economy. This positive dynamic – a combination of direct and indirect effects – must be developed and deepened if we are to achieve the necessary step-change towards mitigating and eventually overcoming the serious structural imbalances that characterise the South African economy.

B.2 Opportunities for Industrialisation

The IPAP is premised on the principle of critical engagement with industry to identify opportunities and constraints and continuous improvement of the corresponding transversal and sector-specific interventions required to unlock industry growth, in close collaboration with all industry stakeholders. In addition, longer term opportunities and policy instruments are identified and inform the research and extensive preparatory work that must underpin the programmes that find expression as KAPs in the IPAP.

The ongoing strength of the Department of Trade and Industry work will be deepened from broad sector knowledge to industry- and firm-specific engagement to understand the constraints, unlock the opportunities and develop the appropriate levers for industrial development across sectors.

B.2.1 Key Areas of Ongoing Intervention

B.2.1.1 Beneficiation

South Africa reportedly has the largest reserves of mineral resources in the world (excluding oil), with an estimated value of \$2.5 trillion. This endowment is dominated by the platinum group of metals (PGMs) (88% of global reserves), manganese (80%), chrome (72%), vanadium (32%) and gold (30%), but include a range of other substantial mineral reserves.

Mineral beneficiation is an area of work that presents much untapped opportunity, but has lagged in terms of policy development and implementation. Much greater attention will have to be devoted to downstream beneficiation opportunities and the enormous potential that exists to deepen and extend the upstream value chain, with a sharp eye towards meeting the explosion of future demand associated with the sub-Saharan commodity boom.

With this in mind, the Department of Trade and Industry has launched a comprehensive research project that will develop a strategy to identify commercialisation opportunities in projects for forward beneficiation and backward supply chain development in key mineral value-chains.

The project will also seek to craft the policy instruments required to support the further expansion of South Africa's extensive capabilities and competitiveness in this sector.

B.2.1.2 Infrastructure Development

Another important opportunity is represented by recent Government commitments to massively scale up its own and regional infrastructure investment

programmes under the Presidential Infrastructure Coordinating Commission (PICC). This offers the possibility of substantially increasing aggregate demand for the key inputs that will be required and, crucially, for the localisation of a wide range of manufactured inputs into the infrastructure build – particularly in the construction, metals, capital and rail transport equipment and renewable energy sectors. A slowdown or interruption of the infrastructure build programme will constitute a threat to its potential positive impact on the manufacturing sector. Significant lessons arising from the Eskom and Transnet build programmes will continue to inform the development of this work.

B.2.1.3 Regional economic development and industrial integration

Higher resource and agricultural commodity prices have gone hand-in-hand with high rates of growth in many countries on the African continent. This growth impetus can be harnessed to lead to broad-based industrial development across the continent. Regional growth is arguably the biggest stimulus to long-term growth in South Africa. Sustained growth, however, requires the recognition and application of important principles like mutually beneficial interdependence and the need to deepen industrial integration and bilateral trade across the region.

These inter-dependencies include, among other things, trade in goods and services, migration of people, power generation and demand, water and transport infrastructure, finance, and the trans-regional operation of companies, including South African multinational companies.

The policy challenges in this area of work are significant. They range from planning cross-border infrastructure to the effective realisation of upstream and downstream linkages in resource exploitation, to the realisation of massive construction opportunities, hence the inclusion of a strong regional focus in the IPAP since its 2012 iteration.

This work is now the subject of greatly stepped-up research, stakeholder engagement and detailed planning, in the context of complex institutional and governance considerations.

B.2.1.4 New Export Markets

South Africa has an important opportunity to grow the base of its exports, particularly with respect to its value-added agricultural manufacturing exports to net food-importing countries in the near and Far East and the Gulf states. This requires the strengthening of existing export market research, market and product identification, development and matching, and an export-promotion drive that fully includes strategic domestic manufacturers.

B.2.1.5 Local Procurement and Supplier Development

The deployment of a range of new procurement instruments across Government has begun to yield significant positive impacts for the domestic economy: for example, the localisation targets in the Transnet and the Passenger Rail Agency of South Africa (PRASA) rail and rolling stock tenders and the supplier development programmes that arise from and have begun to be implemented under the Competitive Supplier Development Programme (CSDP) for SOCs. It is important that the lessons of these programmes are carried over to similar supplier development programmes involving other SOCs and across the full gamut of state procurement.

B.2 Brazil, Russia, India, China and South Africa (BRICS)

South Africa's participation in the BRICS provides important opportunities to build its domestic manufacturing base, enhance value-added exports, promote technology sharing, support small business development and expand trade and

investment opportunities. Innovative proposals relating to the establishment of a BRICS-led Development Bank could contribute to enhanced financial support for domestic and sub-continental infrastructure and regional industrial integration. In the words of Minister Davies: “Deepened co-operation between BRICS countries and Africa offers enormous potential for building Africa-BRICS economic co-operation on a sustainable and mutually beneficial basis.”

These and other opportunities will inform the work of the Department of Trade and Industry and enable the deepening and strengthening of industrial policy in the years to come.

B.3 Industrial Financing

The key objective is to strengthen the role of Development Finance Institutions to channel funding towards productive sectors of the economy.

B.3.1 Nature of the intervention

This intervention involves working closely with DFIs to secure funding for productive activities in the region and to ensure that conditions attached to funding support industrial development.

B.3.2 Economic Rationale

Industrial financing is an important component of industrial development. It helps correct some of the built-in constraints of industrialisation, such as inadequate infrastructure, and skills and technology acquisition. Because industrialisation is inherently a risky process – more so at a regional level where countries with varying

operating environments are involved – finance is typically under-provided and may not be made available for a sufficient duration. The level of Africa’s success in industrialising will, in part, be determined by its ability to mobilise the required resources to channel into the productive sectors of its economies.

Experience from countries that have industrialised rapidly bears witness to the fact that DFIs are extremely important in allocating capital to the productive sectors of the economy, where the private sector can be leveraged in. DFIs in the region are already engaged in a range of activities in a number of countries. Their experience and expertise will be key to taking forward the co-ordinated effort to promote development of regional value chains based on each country’s comparative advantages in various sectors.

B.3.3 Outcomes

Industrialisation and economic development through the promotion of regional value chains.

B.3.4 Key milestones Identified

- 2013 / 2014 Q2: Work with IDC and Development Bank of Southern Africa (DBSA) in implementing their expanded role in investing in the productive sectors of economies across the region.
- 2013 / 2014 Q2: Explore how South Africa can work with regional banks to assist in securing funding lines and ensuring that attached conditions support the industrial development priorities of recipient countries.
- 2013 / 2014 Q2: Exploit new opportunities created by South-South co-operation by exploring how South Africa can work with large developing countries that have substantial financial and other resources which African countries could benefit from through strengthened partnerships.

The Karush-Kuhn-Tucker (KKT) Conditions

The KKT conditions as described by Boyd & Vandenberghe (2004) and Rockafellar (1970)

Given general problem

$$\min_{x \in \mathbb{R}^n} f(x)$$

Subject to

$$h_i(x) \leq 0, i = 1, \dots, m$$

$$l_j = 0, \quad 1, \dots, r$$

The KKT conditions are:

Stationarity

$$0 \in \partial f(x) + \sum_{i=1}^m \mu_i \partial h_i(x) + \sum_{j=1}^r v_j \partial l_j(x)$$

Complementary slackness

$$u_i \cdot h_i(x) = 0 \text{ for all } i$$

Primal feasibility

$$h_i(x) \leq 0, l_j(x) = 0 \text{ for all } i, j$$

Dual feasibility

$$u_i \geq 0 \text{ for all } i$$

Let x^* and u^*, v^* be primal and dual solutions with zero duality gap (strong duality holds, e.g., under Slater's condition). Then:

$$f(x^*) = g(u^*, v^*)$$

$$\begin{aligned}
&= \min_{x \in \mathbb{R}^n} f(x) + \sum_{i=1}^m u_i^* h_i(x) + \sum_{j=1}^r v_j^* l_j(x) \\
&\leq f(x^*) + \sum_{i=1}^m u_i^* h_i(x) + \sum_{j=1}^r v_j^* l_j(x) \\
&\leq f(x^*)
\end{aligned}$$

In other words, all these inequalities are actually equalities. There are two things which we can learn from this:

- (i) The point x^* minimizes $L(x^*, u^*, v^*)$ over $x \in \mathbb{R}^n$. Hence the subdifferential of $L(x^*, u^*, v^*)$ must contain 0 at $x = x^*$. This is exactly the stationarity condition
- (ii) We must have $\sum_{i=1}^m u_i^* h_i(x) = 0$, and since each term here is ≤ 0 , this implies $u_i^* h_i(x) = 0$ for every i . This is exactly complementary slackness.

Primal and dual feasibility obviously hold. It is proven that:

If x^* and u^*, v^* are primal and dual solutions, with zero duality gap, then x^*, u^*, v^* satisfy the KKT conditions.

If there exists x^*, u^*, v^* that satisfy the KKT conditions, then:

$$\begin{aligned}
g(u^*, v^*) &= f(x^*) + \sum_{i=1}^m u_i^* h_i(x) + \sum_{j=1}^r v_j^* l_j(x) \\
&= f(x^*)
\end{aligned}$$

Where the first equality holds from stationarity, and the second holds from complementary slackness.

Therefore duality gap is zero (and x^* and u^*, v^* are primal and dual feasible) so x^* and u^*, v^* are primal and dual optimal. Hence, we've shown:

If x^* and u^*, v^* satisfy KKT condition, then x^* and u^*, v^* are primal and dual solutions.

Therefore, the KKT conditions:

- (i) Always sufficient
- (ii) Necessary under strong duality

For quadratic with equality constraints, consider for $Q \geq 0$,

$$\min_{x \in \mathbb{R}^n} \frac{1}{2} x^T Q x + c^T x$$

Subject to

$$Ax = 0$$

As in Newton step for $\min_{x \in \mathbb{R}^n} f(x)$ subject to $Ax = b$. Convex problem, no inequality constraints, so by KKT conditions, x is a solution if and only if:

$$\begin{bmatrix} Q & A^T \\ A & 0 \end{bmatrix} \begin{bmatrix} x \\ u \end{bmatrix} = \begin{bmatrix} -c \\ 0 \end{bmatrix}$$

For some u . Linear system combines stationarity, primal feasibility (complementary slackness and dual feasibility are vacuous).

Annexure C.

Tables

Table 11: Capital Allocation for Agro and New Industries

		Performance	2010	2011	2012	2013
Agro and New Industries	Agro-Industries	Total value of financing approved (Rm)	770	937	765	738
		Total number of jobs expected to be created or saved	3 133	4 198	5 057	3 952
		Impairments as a % of outstanding book (at cost excluding undrawn commitments)	24%	19%	14%	14%
	Green Industries	Total value of financing approved (Rm)			5 485	3 827
		Total number of jobs expected to be created or saved			2 689	2 031
		Impairments as a % of outstanding book (at cost excluding undrawn commitments)			4%	1%
	Strategic High-impact Projects (SHIP)	Total value of financing approved (Rm)			1 561	192
		Total number of jobs expected to be created or saved			2 670	627
		Impairments as a % of outstanding book (at cost excluding undrawn commitments)			5%	8%
	Venture Capital	Total value of financing approved (Rm)	68	51	187	74
		Total number of jobs expected to be created or saved	104	267	697	146
		Impairments as a % of outstanding book (at cost excluding undrawn commitments)	39%	40%	32%	30%

Data sourced from the Integrated Report March 2013 (Industrial Development Corporation, 2013)

Table 12: Capital Allocation for Mining and Manufacturing Industries

		Performance	2010	2011	2012	2013
Mining and Manufacturing Industries	Chemicals and Allied Industries	Total value of financing approved (Rm)	1 555	541	714	671
		Total number of jobs expected to be created or saved	1 059	1 703	3 283	1 029
		Impairments as a % of outstanding book (at cost excluding undrawn commitments)	29%	14%	12%	8%
	Forestry and Wood Products	Total value of financing approved (Rm)	279	273	363	397
		Total number of jobs expected to be created or saved	2 662	889	6 551	4 646
		Impairments as a % of outstanding book (at cost excluding undrawn commitments)	34%	33%	34%	27%
	Metal, Transport and Machinery Products	Total value of financing approved (Rm)	714	2 104	1 700	1721
		Total number of jobs expected to be created or saved	2 690	6 050	6 861	5 638
		Impairments as a % of outstanding book (at cost excluding undrawn commitments)	20%	19%	13%	13%
	Mining and Minerals Beneficiation	Total value of financing approved (Rm)	3 143	737	3 551	5 342
		Total number of jobs expected to be created or saved	8 744	3 613	12 110	166
		Impairments as a % of outstanding book (at cost excluding undrawn commitments)	13%	14%	16%	11%
	Textiles and Clothing	Total value of financing approved (Rm)	292	539	501	426
		Total number of jobs expected to be created or saved	2 187	10 158	2 420	4 020
		Impairments as a % of outstanding book (at cost excluding undrawn commitments)	45%	41%	51%	60%

Data sourced from the Integrated Report March 2013 (Industrial Development Corporation, 2013)

Table 13: Capital Allocation for Service Industries

		Performance	2010	2011	2012	2013
Services Industries	Information Communication Technology (ICT)	Total value of financing approved (Rm)	183	410	532	1 045
		Total number of jobs expected to be created or saved	3 000	2 131	1 766	211
		Impairments as a % of outstanding book (at cost excluding undrawn commitments)	43%	26%	25%	26%
	Healthcare	Total value of financing approved (Rm)	178	264	170	302
		Total number of jobs expected to be created or saved	(160)*	1 606	1 626	910
		Impairments as a % of outstanding book (at cost excluding undrawn commitments)	9%	6%	4%	8%
	Media and Motion Pictures	Total value of financing approved (Rm)	296	164	429	192
		Total number of jobs expected to be created or saved	(141)*	898	1 400	745
		Impairments as a % of outstanding book (at cost excluding undrawn commitments)	26%	22%	29%	76%
	Tourism	Total value of financing approved (Rm)	324	134	233	273
		Total number of jobs expected to be created or saved	489	276	447	838
		Impairments as a % of outstanding book (at cost excluding undrawn commitments)	5%	8%	12%	16%

Data sourced from the Integrated Report March 2013 (Industrial Development Corporation, 2013)

Table 14: Quantec Data Used and Data Referencing

Quantec Industries Data Used	SIC Code Level	SIC Code Range	Amendments to Data	Data Reference	Model Reference (Industries)
Agriculture, forestry and fishing	1	1		SIC [1]	1
Food	3	301 - 304		SIC [301 - 304]	2
Textiles and wearing apparel	3	311-315	311-317 removing 316 and 317	SIC [311-315]	3
Paper and paper products; printing, publishing and recorded media	3	323-326	321-326 removing 321 and 322	SIC [323-326]	4
Coke, refined petroleum; basic and other chemicals; man-made fibres; plastic products	3	331-338	331-338 removing 337	SIC [331-338]	5
Non-metallic minerals	3	342		SIC [342]	6
Basic iron and steel; metal products excluding machinery; machinery and equipment	3	351, 353-359	351-359 removing 352	SIC [351, 353-359]	7
Electrical machinery	3	361-366		SIC [361-366]	8
Television, radio and communication equipment	3	371-373		SIC [371-373]	9
Motor vehicles, parts and accessories; other transport equipment	3	381-387		SIC [381-387]	10
Furniture and other industries	3	391-392		SIC [391-392]	11
Recycling N.E.C.	3	395	Data not available - excluded from analysis		
Electricity, gas and steam; water supply	2	41-42		SIC [41-42]	12
Construction	2	51		SIC [51]	13
Wholesale and retail trade; hotels and restaurants	2	61-64		SIC [61-64]	14
Transport and storage; communication	2	71-75		SIC [71-75]	15
Finance and insurance	2	81-88		SIC [81-88]	16
Education	2	92	Data not available - excluded from analysis		
Other services	2	93-96		SIC [93-96]	17

Table 15: Formal Employment per Priority Industry

Year	Industry	SIC [1]	SIC [301 - 304]	SIC [311-315]	SIC [323-326]	SIC [331-338]	SIC [342]	C [351, 353-355]	SIC [361-366]	SIC [371-373]	SIC [381-387]	SIC [391-392]	SIC [41-42]	SIC [51]	SIC [61-64]	SIC [71-75]	SIC [81-88]	SIC [93-96]
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
1970	7 576 313	1 866 849	144 013	-	-	-	-	-	42 531	4 145	71 324	42 201	21 448	281 891	-	-	168 253	91 221
1971	7 707 711	1 828 417	147 913	-	-	-	-	243 326	44 912	5 370	75 904	43 664	23 502	305 144	-	386 545	179 031	96 155
1972	7 852 067	1 805 777	152 367	-	-	-	80 012	252 668	47 273	6 499	80 411	45 332	25 638	330 419	937 783	406 894	189 922	101 381
1973	8 113 377	1 793 743	159 488	-	-	88 792	81 447	266 550	49 612	7 787	85 590	47 460	27 428	389 931	972 141	428 950	201 177	106 941
1974	8 378 059	1 783 369	168 518	-	58 409	93 889	84 450	285 817	53 881	8 861	91 260	50 958	29 494	455 217	999 816	455 236	213 160	109 348
1975	8 611 995	1 768 575	179 424	196 118	59 554	96 533	85 410	306 605	56 426	9 898	96 652	50 557	32 994	479 275	1 014 682	485 779	226 258	111 769
1976	8 736 309	1 752 862	188 445	200 008	60 488	100 964	84 713	316 320	57 556	10 690	101 127	51 168	36 744	454 432	1 028 403	502 374	240 396	113 602
1977	8 734 600	1 756 946	191 607	195 201	59 645	101 449	80 840	310 573	54 509	9 548	94 275	50 722	39 060	387 228	1 046 955	513 718	255 159	114 340
1978	8 795 466	1 770 016	193 304	193 472	58 611	107 212	78 758	311 555	51 681	8 954	96 609	52 030	41 112	341 789	1 074 218	526 999	269 632	115 160
1979	8 959 581	1 772 045	198 405	197 256	59 036	111 457	80 365	322 359	51 202	8 711	98 378	56 831	43 732	355 802	1 106 484	538 543	283 609	117 696
1980	9 227 845	1 746 935	205 482	206 028	60 917	119 028	84 793	335 380	54 202	10 804	105 671	64 247	46 964	420 428	1 142 479	553 625	299 148	119 323
1981	9 476 585	1 706 701	210 607	215 579	62 927	128 215	87 995	360 787	57 105	10 637	115 511	69 953	51 480	490 748	1 177 031	573 829	319 464	119 055
1982	9 602 658	1 679 568	212 661	215 275	63 590	135 524	91 030	372 281	54 932	11 165	121 862	71 767	57 926	528 775	1 199 355	587 922	344 313	110 957
1983	9 609 465	1 662 774	213 464	204 055	64 217	134 794	90 089	345 714	51 135	9 753	111 671	72 325	63 920	531 022	1 207 416	587 189	370 063	104 892
1984	9 703 812	1 649 906	218 874	197 828	66 064	137 674	94 847	335 557	49 211	9 929	109 277	72 921	68 201	533 388	1 220 576	591 664	397 071	105 279
1985	9 740 708	1 647 902	222 514	192 884	67 292	139 102	89 399	322 736	45 660	8 498	101 577	72 641	70 529	525 342	1 223 588	590 334	427 322	111 294
1986	9 831 997	1 655 580	226 730	195 818	66 872	139 213	85 895	320 017	45 144	8 695	97 635	77 555	68 038	527 631	1 223 993	578 596	458 974	122 469
1987	9 950 111	1 643 047	233 878	203 655	67 711	146 467	88 376	322 754	45 949	9 096	95 920	84 850	63 375	532 830	1 251 866	559 266	497 756	133 204
1988	10 075 582	1 619 432	238 962	206 977	69 458	150 338	88 430	321 063	47 603	9 559	99 583	91 640	61 719	543 805	1 305 413	552 023	547 298	141 573
1989	10 179 988	1 618 066	243 902	201 366	70 650	153 284	89 616	318 631	50 630	10 594	102 667	94 744	58 743	557 053	1 347 318	545 657	601 780	148 527
1990	10 189 490	1 621 122	247 441	191 405	72 374	154 770	90 432	316 298	53 063	11 394	103 448	96 555	56 375	552 475	1 352 556	535 904	656 155	154 161
1991	10 117 797	1 622 405	246 342	179 374	73 911	155 960	89 966	302 832	55 026	12 278	100 800	97 945	53 928	533 413	1 342 489	526 825	706 880	158 002
1992	10 038 671	1 621 472	246 434	167 182	75 225	155 028	90 466	286 666	55 572	12 814	96 253	99 106	51 334	514 926	1 335 309	510 438	759 411	162 721
1993	9 966 453	1 619 390	241 730	161 003	74 280	152 404	91 983	274 421	53 136	12 553	92 916	101 615	48 574	495 413	1 315 986	475 175	816 227	170 833
1994	9 958 321	1 616 770	231 372	162 215	73 143	141 168	88 269	275 988	52 875	12 524	98 424	101 762	46 523	495 846	1 302 705	454 940	877 421	178 751
1995	10 029 716	1 613 002	233 922	169 748	73 042	136 843	87 414	286 115	51 099	12 625	110 257	104 641	46 288	477 559	1 331 778	455 538	945 693	188 092
1996	10 104 330	1 605 904	243 126	184 700	71 147	129 385	90 721	293 719	46 567	12 788	118 024	112 621	46 829	450 793	1 354 550	454 793	1 022 925	197 715
1997	10 132 157	1 592 951	233 914	176 844	69 255	125 042	87 154	287 324	44 805	11 505	115 596	109 523	47 093	417 374	1 374 412	438 071	1 106 362	208 395
1998	10 053 071	1 575 903	224 746	155 688	67 967	128 250	71 474	272 086	44 373	13 630	115 836	102 203	49 697	377 120	1 431 114	403 166	1 180 228	219 650
1999	10 007 347	1 556 195	223 918	154 120	71 239	122 127	59 938	254 427	41 762	13 558	119 108	101 028	50 945	324 569	1 508 651	385 491	1 244 798	232 467
2000	9 991 749	1 532 655	213 393	154 783	73 776	120 366	54 992	243 668	40 525	12 100	123 597	103 259	48 762	306 466	1 524 868	369 126	1 325 496	247 459
2001	9 852 559	1 395 261	209 562	150 355	72 660	115 821	52 944	247 599	38 452	10 476	126 809	102 716	48 193	296 290	1 530 424	352 151	1 440 815	262 266
2002	9 922 435	1 335 772	206 766	152 375	72 934	116 931	51 695	253 019	38 240	9 369	124 706	108 177	47 547	285 537	1 528 038	342 404	1 565 725	279 248
2003	9 915 031	1 257 028	185 363	150 057	76 407	127 907	52 675	264 215	36 747	8 075	120 307	109 189	44 383	248 373	1 514 306	345 724	1 640 037	292 945
2004	9 982 131	1 170 438	188 036	144 334	80 187	131 007	58 975	273 902	36 860	7 454	120 363	106 725	45 462	216 127	1 569 109	351 539	1 692 679	326 009
2005	10 071 482	1 115 721	196 229	131 384	80 190	138 984	69 005	273 997	38 345	7 724	121 593	106 868	48 459	269 135	1 636 644	359 993	1 646 872	330 388
2006	10 290 130	1 093 318	189 661	126 714	84 795	141 691	68 921	283 784	39 161	7 862	122 506	105 271	49 386	285 585	1 677 947	356 962	1 750 491	324 207
2007	10 474 468	994 332	183 185	121 178	83 615	141 321	66 461	288 076	39 259	7 191	119 596	106 661	52 025	283 574	1 735 442	359 891	1 843 307	309 623
2008	10 501 687	828 726	185 463	111 014	86 168	143 020	63 407	286 239	39 901	6 726	119 295	95 706	55 794	274 618	1 728 618	364 083	1 907 495	305 899
2009	10 108 520	693 209	182 760	97 220	87 220	135 035	51 689	272 982	36 556	6 718	107 723	85 046	55 997	243 655	1 661 904	357 481	1 816 214	306 665
2010	9 936 760	626 430	177 855	92 453	84 752	131 453	48 316	270 174	34 891	6 611	102 964	78 175	57 245	221 901	1 650 695	358 419	1 776 492	303 174
2011	10 075 445	621 238	171 793	87 355	83 456	130 503	47 692	268 751	37 472	6 737	102 224	77 958	59 528	221 312	1 668 217	362 651	1 820 323	306 663
2012	10 202 153	661 470	170 946	83 719	81 384	131 219	47 904	270 883	38 074	6 767	102 490	78 573	61 695	216 990	1 691 468	374 548	1 835 831	307 998

Table 16: Data Statistics for Formal Employment per Priority Industry

Raw Data	Mean	Median	Minimum	Maximum	Std. Dev.	C.V.	Skewness	Ex. Kurtosis	5% Perc.	95% Perc.	IQ range	Missing Obs
Industry	2 161 800	1 826 100	1 108 000	4 140 700	908 600	0.4203	0.8724	-0.5259	1 123 100	3 993 000	1 346 700	0
SIC_1_	61 026	56 252	28 537	107 790	23 354	0.3827	0.5223	-0.8297	29 269	104 580	40 694	0
SIC_301_304_	89 129	82 969	41 887	147 190	31 495	0.3534	0.5192	-0.6954	42 498	146 380	37 945	0
SIC_311_315_	29 185	28 973	19 940	37 552	4 418	0.1514	-0.1307	-0.3607	20 448	36 352	4 728	5
SIC_323_326_	47 129	44 738	24 005	77 977	15 571	0.3304	0.2699	-0.8940	24 419	72 658	21 651	4
SIC_331_338_	137 940	102 230	40 363	269 500	79 338	0.5752	0.5093	-1.3084	41 554	266 930	147 990	3
SIC_342_	19 403	17 909	13 879	28 466	4 007	0.2065	0.9040	-0.3179	14 049	28 091	4 705	2
SIC_351_353_35~	129 020	116 790	80 149	214 500	38 565	0.2989	0.9112	-0.4264	81 497	207 860	61 346	1
SIC_361_366_	19 320	16 366	6 976	37 553	8 727	0.4517	0.6547	-0.7279	7 132	36 263	13 534	0
SIC_371_373_	6 171	6 182	2 554	10 328	1 760	0.2852	0.0188	0.1798	2 735	9 531	1 873	0
SIC_381_387_	79 565	56 474	35 352	163 070	43 584	0.5478	0.8122	-1.0455	36 473	155 920	85 439	0
SIC_391_392_	34 706	38 336	13 244	65 108	17 721	0.5106	0.2129	-1.4546	13 908	61 703	34 985	0
SIC_41_42_	45 800	44 171	14 779	76 412	18 776	0.4100	0.0633	-1.1012	15 958	75 580	30 263	0
SIC_51_	71 583	60 235	43 402	140 930	26 600	0.3716	1.5892	1.2655	44 931	138 200	18 554	0
SIC_61_64_	251 930	210 200	125 770	467 810	97 996	0.3890	0.8306	-0.6014	135 880	445 840	138 140	2
SIC_71_75_	167 770	112 650	44 469	374 960	106 630	0.6356	0.7536	-0.9888	47 391	361 620	190 830	1
SIC_81_88_	317 940	221 700	132 100	797 320	203 350	0.6396	1.1398	-0.0960	133 660	757 420	266 680	0
SIC_93_96_	59 654	39 177	17 361	153 510	43 293	0.7257	0.8778	-0.7045	17 630	140 720	71 897	0

Table 17: Formal Employment Industry Contribution per Priority Industry

Year	Industry	SIC [1]	SIC [301 - 304]	SIC [311-315]	SIC [323-326]	SIC [331-338]	SIC [342]	SIC [351, 353-356]	SIC [361-366]	SIC [371-373]	SIC [381-387]	SIC [391-392]	SIC [41-42]	SIC [51]	SIC [61-64]	SIC [71-75]	SIC [81-88]	SIC [93-96]
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
1970	100.00%	24.64%	1.90%	0.00%	0.00%	0.00%	0.00%	0.00%	0.56%	0.05%	0.94%	0.56%	0.28%	3.72%	0.00%	0.00%	2.22%	1.20%
1971	100.00%	23.72%	1.92%	0.00%	0.00%	0.00%	0.00%	3.16%	0.58%	0.07%	0.98%	0.57%	0.30%	3.96%	0.00%	5.02%	2.32%	1.25%
1972	100.00%	23.00%	1.94%	0.00%	0.00%	0.00%	1.02%	3.22%	0.60%	0.08%	1.02%	0.58%	0.33%	4.21%	11.94%	5.18%	2.42%	1.29%
1973	100.00%	22.11%	1.97%	0.00%	0.00%	1.09%	1.00%	3.29%	0.61%	0.10%	1.05%	0.58%	0.34%	4.81%	11.98%	5.29%	2.48%	1.32%
1974	100.00%	21.29%	2.01%	0.00%	0.70%	1.12%	1.01%	3.41%	0.64%	0.11%	1.09%	0.61%	0.35%	5.43%	11.93%	5.43%	2.54%	1.31%
1975	100.00%	20.54%	2.08%	2.28%	0.69%	1.12%	0.99%	3.56%	0.66%	0.11%	1.12%	0.59%	0.38%	5.57%	11.78%	5.64%	2.63%	1.30%
1976	100.00%	20.06%	2.16%	2.29%	0.69%	1.16%	0.97%	3.62%	0.66%	0.12%	1.16%	0.59%	0.42%	5.20%	11.77%	5.75%	2.75%	1.30%
1977	100.00%	20.11%	2.19%	2.23%	0.68%	1.16%	0.93%	3.56%	0.62%	0.11%	1.08%	0.58%	0.45%	4.43%	11.99%	5.88%	2.92%	1.31%
1978	100.00%	20.12%	2.20%	2.20%	0.67%	1.22%	0.90%	3.54%	0.59%	0.10%	1.10%	0.59%	0.47%	3.89%	12.21%	5.99%	3.07%	1.31%
1979	100.00%	19.78%	2.21%	2.20%	0.66%	1.24%	0.90%	3.20%	0.57%	0.10%	1.10%	0.63%	0.49%	3.97%	12.35%	6.01%	3.17%	1.31%
1980	100.00%	18.93%	2.23%	2.23%	0.66%	1.29%	0.92%	3.63%	0.59%	0.12%	1.15%	0.70%	0.51%	4.56%	12.38%	6.00%	3.24%	1.29%
1981	100.00%	18.01%	2.22%	2.27%	0.66%	1.35%	0.93%	3.81%	0.60%	0.11%	1.22%	0.74%	0.54%	5.18%	12.42%	6.06%	3.37%	1.26%
1982	100.00%	17.49%	2.21%	2.24%	0.66%	1.41%	0.95%	3.88%	0.57%	0.12%	1.27%	0.75%	0.60%	5.51%	12.49%	6.12%	3.59%	1.16%
1983	100.00%	17.30%	2.22%	2.12%	0.67%	1.40%	0.94%	3.60%	0.53%	0.10%	1.16%	0.75%	0.67%	5.53%	12.56%	6.11%	3.85%	1.09%
1984	100.00%	17.00%	2.26%	2.04%	0.68%	1.42%	0.98%	3.46%	0.51%	0.10%	1.13%	0.75%	0.70%	5.50%	12.58%	6.10%	4.09%	1.08%
1985	100.00%	16.92%	2.28%	1.98%	0.69%	1.43%	0.92%	3.31%	0.47%	0.09%	1.04%	0.75%	0.72%	5.39%	12.56%	6.06%	4.39%	1.14%
1986	100.00%	16.84%	2.31%	1.99%	0.68%	1.42%	0.87%	3.25%	0.46%	0.09%	0.99%	0.79%	0.69%	5.37%	12.45%	5.88%	4.67%	1.25%
1987	100.00%	16.51%	2.35%	2.05%	0.68%	1.47%	0.89%	3.24%	0.46%	0.09%	0.96%	0.85%	0.64%	5.36%	12.58%	5.62%	5.00%	1.34%
1988	100.00%	16.07%	2.37%	2.05%	0.69%	1.49%	0.88%	3.19%	0.47%	0.09%	0.99%	0.91%	0.61%	5.40%	12.96%	5.48%	5.43%	1.41%
1989	100.00%	15.89%	2.40%	1.98%	0.69%	1.51%	0.88%	3.13%	0.50%	0.10%	1.01%	0.93%	0.58%	5.47%	13.23%	5.36%	5.91%	1.46%
1990	100.00%	15.91%	2.43%	1.88%	0.71%	1.52%	0.89%	3.10%	0.52%	0.11%	1.02%	0.95%	0.55%	5.42%	13.27%	5.26%	6.44%	1.51%
1991	100.00%	16.04%	2.43%	1.77%	0.73%	1.54%	0.89%	2.99%	0.54%	0.12%	1.00%	0.97%	0.53%	5.27%	13.27%	5.21%	6.99%	1.56%
1992	100.00%	16.15%	2.45%	1.67%	0.75%	1.54%	0.90%	2.86%	0.55%	0.13%	0.96%	0.99%	0.51%	5.13%	13.30%	5.08%	7.56%	1.62%
1993	100.00%	16.25%	2.43%	1.62%	0.75%	1.53%	0.92%	2.75%	0.53%	0.13%	0.93%	1.02%	0.49%	4.97%	13.20%	4.77%	8.19%	1.71%
1994	100.00%	16.24%	2.32%	1.63%	0.73%	1.42%	0.89%	2.77%	0.53%	0.13%	0.99%	1.02%	0.47%	4.98%	13.08%	4.57%	8.81%	1.79%
1995	100.00%	16.08%	2.33%	1.69%	0.73%	1.36%	0.87%	2.85%	0.51%	0.13%	1.10%	1.04%	0.46%	4.76%	13.28%	4.54%	9.43%	1.88%
1996	100.00%	15.89%	2.41%	1.83%	0.70%	1.28%	0.90%	2.91%	0.46%	0.13%	1.17%	1.11%	0.46%	4.46%	13.41%	4.50%	10.12%	1.96%
1997	100.00%	15.72%	2.31%	1.75%	0.68%	1.23%	0.86%	2.84%	0.44%	0.11%	1.14%	1.08%	0.46%	4.12%	13.56%	4.32%	10.92%	2.06%
1998	100.00%	15.68%	2.24%	1.55%	0.68%	1.28%	0.71%	2.71%	0.44%	0.14%	1.15%	1.02%	0.49%	3.75%	14.24%	4.01%	11.74%	2.18%
1999	100.00%	15.55%	2.24%	1.54%	0.71%	1.22%	0.60%	2.54%	0.42%	0.14%	1.19%	1.01%	0.51%	3.24%	15.08%	3.85%	12.44%	2.32%
2000	100.00%	15.34%	2.14%	1.55%	0.74%	1.20%	0.55%	2.44%	0.41%	0.12%	1.24%	1.03%	0.49%	3.07%	15.26%	3.69%	13.27%	2.48%
2001	100.00%	14.16%	2.13%	1.53%	0.74%	1.18%	0.54%	2.51%	0.39%	0.11%	1.29%	1.04%	0.49%	3.01%	15.53%	3.57%	14.62%	2.66%
2002	100.00%	13.46%	2.08%	1.54%	0.74%	1.18%	0.52%	2.55%	0.39%	0.09%	1.26%	1.09%	0.48%	2.88%	15.40%	3.45%	15.78%	2.81%
2003	100.00%	12.68%	1.87%	1.51%	0.77%	1.29%	0.53%	2.69%	0.37%	0.08%	1.21%	1.10%	0.45%	2.51%	15.27%	3.49%	16.54%	2.95%
2004	100.00%	11.73%	1.88%	1.45%	0.80%	1.31%	0.59%	2.74%	0.37%	0.07%	1.21%	1.07%	0.46%	2.17%	15.72%	3.52%	16.96%	3.27%
2005	100.00%	11.08%	1.95%	1.30%	0.80%	1.38%	0.69%	2.72%	0.38%	0.08%	1.21%	1.06%	0.48%	2.67%	16.25%	3.57%	16.35%	3.28%
2006	100.00%	10.62%	1.84%	1.23%	0.82%	1.38%	0.67%	2.76%	0.38%	0.08%	1.19%	1.02%	0.48%	2.78%	16.31%	3.47%	17.01%	3.15%
2007	100.00%	9.49%	1.75%	1.16%	0.80%	1.35%	0.63%	2.75%	0.37%	0.07%	1.14%	1.02%	0.50%	2.71%	16.57%	3.44%	17.60%	2.96%
2008	100.00%	7.89%	1.77%	1.06%	0.82%	1.36%	0.60%	2.73%	0.38%	0.06%	1.14%	0.91%	0.53%	2.61%	16.46%	3.47%	18.16%	2.91%
2009	100.00%	6.86%	1.81%	0.96%	0.86%	1.34%	0.61%	2.70%	0.36%	0.07%	1.07%	0.84%	0.55%	2.41%	16.44%	3.54%	17.97%	3.03%
2010	100.00%	6.30%	1.79%	0.93%	0.85%	1.32%	0.49%	2.72%	0.35%	0.07%	1.04%	0.79%	0.58%	2.23%	16.61%	3.61%	17.88%	3.05%
2011	100.00%	6.17%	1.71%	0.87%	0.83%	1.30%	0.47%	2.67%	0.37%	0.07%	1.01%	0.77%	0.59%	2.20%	16.56%	3.60%	18.07%	3.04%
2012	100.00%	6.48%	1.68%	0.82%	0.80%	1.29%	0.47%	2.66%	0.37%	0.07%	1.00%	0.77%	0.60%	2.13%	16.58%	3.67%	17.99%	3.02%

Table 18: Formal Employment Growth Rate per Priority Industry

Year	Industry	SIC [1]	SIC [301 - 304]	SIC [311-315]	SIC [323-326]	SIC [331-338]	SIC [342]	C [351, 353-355]	SIC [361-366]	SIC [371-373]	SIC [381-387]	SIC [391-392]	SIC [41-42]	SIC [51]	SIC [61-64]	SIC [71-75]	SIC [81-88]	SIC [93-96]
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
1970																		
1971	1.73%	-2.06%	2.71%						5.60%	29.54%	6.42%	3.47%	9.58%	8.25%			6.41%	5.41%
1972	1.87%	-1.24%	3.01%					3.84%	5.26%	21.04%	5.94%	3.82%	9.09%	8.28%		5.26%	6.08%	5.43%
1973	3.33%	-0.67%	4.67%				1.79%	5.49%	4.95%	19.82%	6.44%	4.69%	6.98%	18.01%	3.66%	5.42%	5.93%	5.48%
1974	3.26%	-0.58%	5.66%			5.74%	3.69%	7.23%	8.60%	13.79%	6.62%	7.37%	7.53%	16.74%	2.85%	6.13%	5.96%	2.25%
1975	2.79%	-0.83%	6.47%		1.96%	2.82%	1.14%	7.27%	4.72%	11.70%	5.91%	-0.79%	11.87%	5.29%	1.49%	6.71%	6.14%	2.21%
1976	1.44%	-0.89%	5.03%	1.98%	1.57%	4.59%	-0.82%	3.17%	2.00%	8.00%	4.63%	1.21%	11.37%	-5.18%	1.35%	3.42%	6.25%	1.64%
1977	-0.02%	0.23%	1.68%	-2.40%	-1.39%	0.48%	-4.57%	-1.82%	-5.29%	-10.68%	-6.78%	-0.87%	6.30%	-14.79%	1.80%	2.26%	6.14%	0.65%
1978	0.70%	0.74%	0.89%	-0.89%	-1.73%	5.68%	-2.58%	0.32%	-5.19%	-6.22%	2.48%	2.58%	5.26%	-11.73%	2.60%	2.59%	5.67%	0.72%
1979	1.87%	0.11%	2.64%	1.96%	0.72%	3.96%	2.04%	3.47%	-0.93%	-2.72%	1.83%	9.23%	6.37%	4.10%	3.00%	2.19%	5.18%	2.20%
1980	2.99%	-1.42%	3.57%	4.45%	3.19%	6.79%	5.51%	4.04%	5.86%	24.04%	7.41%	13.05%	7.39%	18.16%	3.25%	2.80%	5.48%	1.38%
1981	2.70%	-2.30%	2.49%	4.64%	3.30%	7.72%	3.78%	7.58%	5.36%	-1.55%	9.31%	8.88%	9.62%	16.73%	3.02%	3.65%	6.79%	-0.23%
1982	1.33%	-1.59%	0.98%	-0.14%	1.05%	5.70%	3.45%	3.19%	-3.80%	4.96%	5.50%	2.59%	12.52%	7.75%	1.90%	2.46%	7.78%	-6.80%
1983	0.07%	-1.00%	0.38%	-5.21%	0.99%	-0.54%	-1.03%	-7.14%	-6.91%	-12.65%	-8.36%	0.78%	10.35%	0.43%	0.67%	-0.12%	7.48%	-5.47%
1984	0.98%	-0.77%	2.53%	-3.05%	2.88%	2.14%	5.28%	-2.94%	-3.76%	1.81%	-2.14%	0.82%	6.70%	0.45%	1.09%	0.76%	7.30%	0.37%
1985	0.38%	-0.12%	1.66%	-2.50%	1.86%	1.04%	-5.74%	-3.82%	-7.22%	-14.41%	-7.05%	-0.38%	3.41%	-1.51%	0.25%	-0.22%	7.62%	5.71%
1986	0.94%	0.47%	1.89%	1.52%	-0.62%	0.08%	-3.92%	-0.84%	-1.13%	2.31%	-3.88%	6.77%	-3.53%	0.44%	0.03%	-1.99%	7.41%	10.04%
1987	1.20%	-0.76%	3.15%	4.00%	1.25%	5.21%	2.89%	0.86%	1.78%	4.62%	-1.76%	9.41%	-6.85%	0.99%	2.28%	-3.34%	8.45%	8.77%
1988	1.26%	-1.44%	2.17%	1.63%	2.58%	2.64%	0.06%	-0.52%	3.60%	5.08%	3.82%	8.00%	-2.61%	2.06%	4.28%	-1.30%	9.95%	6.28%
1989	1.04%	-0.08%	2.07%	-2.71%	1.72%	1.96%	1.34%	-0.76%	6.36%	10.83%	3.10%	3.39%	-4.82%	2.44%	3.21%	-1.15%	9.95%	4.91%
1990	0.09%	0.19%	1.45%	-4.95%	2.44%	0.97%	0.91%	-0.73%	4.81%	7.55%	0.76%	1.91%	-4.03%	-0.82%	0.39%	-1.79%	9.04%	3.79%
1991	-0.70%	0.08%	-0.44%	-6.29%	2.12%	0.77%	-0.52%	-4.26%	3.70%	7.76%	-2.56%	1.44%	-4.34%	-3.45%	-0.74%	-1.69%	7.73%	2.49%
1992	-0.78%	-0.06%	0.04%	-6.80%	1.78%	-0.60%	0.56%	-5.34%	0.99%	4.37%	-4.51%	1.18%	-4.81%	-3.47%	-0.53%	-3.11%	7.43%	2.99%
1993	-0.72%	-0.13%	-1.91%	-3.70%	-1.26%	-1.69%	1.68%	-4.27%	-4.38%	-2.04%	-3.47%	2.53%	-5.38%	-3.79%	-1.45%	-6.91%	7.48%	4.99%
1994	-0.08%	-0.16%	-4.28%	0.75%	-1.53%	-7.37%	-4.04%	0.57%	-0.49%	-0.23%	5.93%	0.14%	-4.22%	0.09%	-1.01%	-4.26%	7.50%	4.64%
1995	0.72%	-0.23%	1.10%	4.64%	-0.14%	-3.06%	-0.97%	3.67%	-3.36%	0.80%	12.02%	2.83%	-0.51%	-3.69%	2.23%	0.13%	7.78%	5.23%
1996	0.74%	-0.44%	3.93%	8.81%	-2.59%	-5.45%	3.78%	2.66%	-8.87%	1.29%	7.05%	7.63%	1.17%	-5.60%	1.71%	-0.16%	8.17%	5.12%
1997	0.28%	-0.81%	-3.79%	-4.25%	-2.66%	-3.36%	-3.93%	-2.18%	-3.78%	-10.03%	-2.06%	-2.75%	0.56%	-7.41%	1.47%	-3.68%	8.16%	5.40%
1998	-0.78%	-1.07%	-3.92%	-11.96%	-1.86%	2.57%	-17.99%	-5.30%	-0.96%	18.47%	0.21%	-6.68%	5.53%	-9.64%	4.13%	-7.97%	6.68%	5.40%
1999	-0.45%	-1.25%	-0.37%	-1.01%	4.81%	-4.77%	-16.14%	-6.49%	-5.89%	-0.53%	2.83%	-1.15%	2.51%	-13.93%	5.42%	-4.38%	5.47%	5.84%
2000	-0.16%	-1.51%	-4.70%	0.43%	3.56%	-1.44%	-8.25%	-4.23%	-2.96%	-10.75%	3.77%	2.21%	-4.29%	-5.58%	1.07%	-4.25%	6.48%	6.45%
2001	-1.39%	-8.96%	-1.80%	-2.86%	-1.51%	-3.78%	-3.72%	1.61%	-5.12%	-13.42%	2.60%	-0.53%	-1.17%	-3.32%	0.36%	-4.60%	8.70%	5.98%
2002	0.71%	-4.26%	-1.33%	1.34%	0.38%	0.96%	-2.36%	2.19%	-0.55%	-10.57%	-1.66%	5.32%	-1.34%	-3.63%	-0.16%	-2.77%	8.67%	6.48%
2003	-0.07%	-5.89%	-10.35%	-1.52%	4.76%	9.39%	1.89%	4.43%	-3.90%	-13.81%	-3.53%	0.94%	-6.65%	-13.02%	-0.90%	0.97%	4.75%	4.90%
2004	0.68%	-6.89%	1.44%	-3.81%	4.95%	2.42%	11.96%	3.67%	0.31%	-7.70%	0.05%	-2.26%	2.43%	-12.98%	3.62%	1.68%	3.21%	11.29%
2005	0.90%	-4.67%	4.36%	-8.97%	0.00%	6.09%	17.01%	0.03%	4.03%	3.62%	1.02%	0.13%	6.59%	24.53%	4.30%	2.40%	-2.71%	1.34%
2006	2.17%	-2.01%	-3.35%	-3.55%	5.74%	1.95%	-0.12%	3.57%	2.13%	1.79%	0.75%	-1.50%	1.91%	6.11%	2.52%	-0.84%	6.29%	-1.87%
2007	1.79%	-9.05%	-3.41%	-4.37%	-1.39%	-0.26%	-3.57%	1.51%	0.25%	-8.53%	-2.38%	1.32%	5.34%	-0.70%	3.43%	0.82%	5.30%	-4.50%
2008	0.26%	-16.66%	1.24%	-8.39%	3.05%	1.20%	-4.59%	-0.64%	1.64%	-6.46%	-0.25%	-10.27%	7.25%	-3.16%	-0.39%	1.16%	3.48%	-1.20%
2009	-3.74%	-16.35%	-1.46%	-12.43%	1.22%	-5.58%	-18.48%	-4.63%	-8.38%	-0.12%	-9.70%	-11.14%	0.36%	-11.27%	-3.86%	-1.81%	-4.79%	0.25%
2010	-1.70%	-9.63%	-2.68%	-4.90%	-2.83%	-2.65%	-6.53%	-1.03%	-4.55%	-1.60%	-4.42%	-8.08%	2.23%	-8.93%	-0.67%	0.26%	-2.19%	-1.14%
2011	1.40%	-0.83%	-3.41%	-5.51%	-1.53%	-0.72%	-1.29%	-0.53%	7.40%	1.90%	-0.72%	-0.28%	3.99%	-0.27%	1.06%	1.18%	2.47%	1.15%
2012	1.26%	6.48%	-0.49%	-4.16%	-2.48%	0.55%	0.44%	0.79%	1.61%	0.46%	0.26%	0.79%	3.64%	-1.95%	1.39%	3.28%	0.85%	0.44%

Table 19: Data Statistics for Formal Employment Growth Rate per Priority Industry

Growth Rate	Mean	Median	Minimum	Maximum	Std. Dev.	C.V.	Skewness	Ex. Kurtosis	5% Perc.	95% Perc.	IQ range	Missing Obs
Industry	0.0072	0.0073	-0.0374	0.0333	0.0140	1.9402	-0.5191	1.1443	-0.0165	0.0322	0.0159	1
SIC_1_	-0.0234	-0.0086	-0.1666	0.0648	0.0433	1.8483	-1.8013	3.7365	-0.1535	0.0070	0.0199	1
SIC_301_304_	0.0046	0.0117	-0.1035	0.0647	0.0336	7.2247	-0.7588	0.9074	-0.0464	0.0557	0.0448	1
SIC_311_315_	-0.0217	-0.0271	-0.1243	0.0881	0.0464	2.1403	-0.0199	-0.0074	-0.1201	0.0506	0.0636	6
SIC_323_326_	0.0090	0.0114	-0.0283	0.0574	0.0238	2.6330	0.1441	-0.9519	-0.0267	0.0499	0.0408	5
SIC_331_338_	0.0108	0.0097	-0.0737	0.0939	0.0390	3.6118	-0.0584	-0.4410	-0.0558	0.0772	0.0540	4
SIC_342_	-0.0105	-0.0032	-0.1848	0.1701	0.0666	6.3465	-0.4569	1.9808	-0.1790	0.1164	0.0593	3
SIC_351_353_35~	0.0033	0.0032	-0.0714	0.0758	0.0384	11.5000	-0.0448	-0.7558	-0.0638	0.0727	0.0608	2
SIC_361_366_	-0.0015	-0.0012	-0.0887	0.0860	0.0470	30.3990	-0.0375	-1.0968	-0.0821	0.0724	0.0823	1
SIC_371_373_	0.0170	0.0105	-0.1441	0.2954	0.1066	6.2613	0.6128	0.0055	-0.1375	0.2359	0.1437	1
SIC_381_387_	0.0099	0.0076	-0.0970	0.1202	0.0496	5.0308	-0.0712	-0.5208	-0.0817	0.0903	0.0802	1
SIC_391_392_	0.0161	0.0126	-0.1114	0.1305	0.0501	3.1033	-0.3504	0.6940	-0.0994	0.0938	0.0463	1
SIC_41_42_	0.0270	0.0296	-0.0685	0.1252	0.0560	2.0771	-0.0782	-1.1449	-0.0646	0.1179	0.0989	1
SIC_51_	-0.0021	-0.0117	-0.1479	0.2453	0.0928	43.2330	0.7444	0.2599	-0.1380	0.1814	0.0998	1
SIC_61_64_	0.0150	0.0148	-0.0386	0.0542	0.0192	1.2782	-0.3258	0.0207	-0.0143	0.0430	0.0293	3
SIC_71_75_	-0.0002	0.0013	-0.0797	0.0671	0.0341	173.2500	-0.1584	-0.3603	-0.0668	0.0606	0.0481	2
SIC_81_88_	0.0590	0.0644	-0.0479	0.0995	0.0317	0.5367	-1.7860	3.1115	-0.0263	0.0982	0.0231	1
SIC_93_96_	0.0301	0.0339	-0.0680	0.1129	0.0383	1.2723	-0.4246	0.2787	-0.0532	0.0985	0.0485	1

Table 20: Correlation Matrix for Growth Rates of Formal Employment per Priority Industry

Industries	Correlation																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	1.000	0.226	0.399	-0.137	0.140	0.233	0.027	0.192	0.258	0.269	0.567	-0.025	0.173	0.318	0.062	0.491	0.178
2	0.226	1.000	0.330	0.071	0.273	0.430	0.345	0.361	0.487	0.383	0.411	0.490	0.526	0.367	0.564	0.099	0.028
3	0.399	0.330	1.000	0.057	0.130	0.301	0.570	-0.010	0.023	0.617	0.793	-0.041	0.189	0.263	0.223	0.492	0.252
4	-0.137	0.071	0.057	1.000	0.395	0.160	0.125	0.254	0.075	0.097	0.090	-0.016	0.142	0.158	0.143	0.105	0.072
5	0.140	0.273	0.130	0.395	1.000	0.514	0.488	0.476	0.264	0.178	0.403	0.333	0.460	0.371	0.536	0.036	-0.155
6	0.233	0.430	0.301	0.160	0.514	1.000	0.519	0.431	0.140	0.297	0.505	0.131	0.570	0.262	0.499	0.073	-0.014
7	0.027	0.345	0.570	0.125	0.488	0.519	1.000	0.473	0.276	0.656	0.435	0.337	0.496	0.284	0.684	0.039	-0.003
8	0.192	0.361	-0.010	0.254	0.476	0.431	0.473	1.000	0.647	0.445	0.348	0.162	0.651	0.343	0.413	0.066	0.055
9	0.258	0.487	0.023	0.075	0.264	0.140	0.276	0.647	1.000	0.502	0.282	0.286	0.539	0.330	0.281	0.042	0.083
10	0.269	0.383	0.617	0.097	0.178	0.297	0.656	0.445	0.502	1.000	0.476	0.272	0.479	0.516	0.342	0.279	0.127
11	0.567	0.411	0.793	0.090	0.403	0.505	0.435	0.348	0.282	0.476	1.000	-0.034	0.511	0.383	0.230	0.515	0.221
12	-0.025	0.490	-0.041	-0.016	0.333	0.131	0.337	0.162	0.286	0.272	-0.034	1.000	0.392	0.364	0.682	-0.219	-0.538
13	0.173	0.526	0.189	0.142	0.460	0.570	0.496	0.651	0.539	0.479	0.511	0.392	1.000	0.346	0.483	0.014	-0.188
14	0.318	0.367	0.263	0.158	0.371	0.262	0.284	0.343	0.330	0.516	0.383	0.364	0.346	1.000	0.256	0.175	0.071
15	0.062	0.564	0.223	0.143	0.536	0.499	0.684	0.413	0.281	0.342	0.230	0.682	0.483	0.256	1.000	-0.256	-0.350
16	0.491	0.099	0.492	0.105	0.036	0.073	0.039	0.066	0.042	0.279	0.515	-0.219	0.014	0.175	-0.256	1.000	0.285
17	0.178	0.028	0.252	0.072	-0.155	-0.014	-0.003	0.055	0.083	0.127	0.221	-0.538	-0.188	0.071	-0.350	0.285	1.000

Table 21: Real Output per Priority Industry

Year	Industry	SIC [1]	IC [301-304]	IC [311-314]	IC [323-326]	IC [331-334]	SIC [342]	[351, 353-355]	IC [361-364]	IC [371-374]	IC [381-384]	IC [391-394]	SIC [41-42]	SIC [51]	SIC [61-64]	SIC [71-75]	SIC [81-88]	SIC [93-96]
	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices
1970	1 108 026	28 751	42 279	-	-	-	-	-	6 976	2 761	36 911	17 975	14 779	58 707	-	-	136 908	18 875
1971	1 125 961	33 537	41 887	-	-	-	-	80 149	7 107	2 554	35 352	14 122	15 643	60 671	-	44 469	132 095	18 596
1972	1 122 427	31 338	43 371	-	-	-	13 879	80 348	7 233	2 728	36 364	14 276	17 222	65 130	125 769	46 687	132 842	17 510
1973	1 175 732	28 537	45 699	-	-	41 273	15 400	88 003	8 583	3 286	41 879	14 402	19 011	66 124	134 765	51 382	138 779	17 361
1974	1 231 202	39 660	46 896	-	24 419	40 363	15 912	91 795	9 473	3 323	44 311	13 855	21 048	65 924	145 938	60 982	146 384	18 111
1975	1 318 100	37 590	56 691	19 940	24 867	46 893	16 575	99 235	12 975	5 243	52 844	16 376	22 885	59 636	160 563	68 823	151 028	19 051
1976	1 341 297	34 077	59 723	22 166	25 914	51 023	16 408	100 025	13 826	5 644	46 560	16 715	23 225	54 092	162 963	71 625	151 377	20 637
1977	1 328 559	36 202	60 986	20 475	24 005	51 951	13 933	93 716	12 072	4 722	41 017	17 318	24 014	48 931	155 615	73 624	148 537	21 967
1978	1 360 747	37 415	63 276	21 172	24 457	57 653	15 095	100 678	12 404	5 255	44 059	15 178	24 675	44 439	155 319	75 891	153 455	22 285
1979	1 397 103	36 400	65 843	23 328	26 236	58 631	15 428	108 525	12 448	4 298	42 138	13 244	26 515	43 402	151 564	83 335	159 251	22 668
1980	1 495 014	43 890	69 749	27 026	29 254	63 886	18 485	120 131	14 425	5 610	53 542	14 537	29 284	46 900	170 440	89 882	169 456	23 334
1981	1 620 225	46 902	69 881	31 198	32 958	74 377	20 138	138 211	17 846	6 182	65 912	17 227	33 230	55 559	186 809	99 303	178 400	25 932
1982	1 595 617	45 378	72 000	27 564	32 679	70 852	18 522	129 133	16 973	6 685	59 220	15 899	35 015	56 313	183 449	94 590	182 406	27 702
1983	1 601 912	40 627	79 122	27 222	36 010	73 476	19 307	120 977	17 751	7 269	53 956	16 607	35 058	57 965	189 214	90 352	187 675	29 730
1984	1 700 691	45 844	78 578	29 226	39 170	85 530	20 965	122 544	17 672	7 037	54 371	17 647	38 078	60 235	210 202	101 566	198 065	30 991
1985	1 678 458	48 196	77 808	26 285	37 389	81 177	17 118	117 174	15 969	6 832	41 789	17 516	39 942	59 642	205 014	102 798	199 547	33 319
1986	1 651 948	46 628	75 920	26 169	41 702	79 435	16 731	99 586	12 284	6 318	40 538	21 009	40 408	55 707	201 573	101 832	204 314	35 276
1987	1 729 610	51 601	74 782	27 861	42 504	89 405	16 794	96 469	13 669	7 531	45 499	22 586	40 732	54 783	209 576	103 055	211 880	36 826
1988	1 799 424	54 129	71 499	27 871	44 582	94 945	18 933	102 811	14 722	6 671	55 999	26 215	41 922	56 704	215 171	108 029	216 369	38 273
1989	1 834 877	56 252	72 925	28 720	44 984	96 728	19 039	110 640	14 758	6 498	54 751	30 824	42 911	58 601	210 428	112 102	224 718	39 177
1990	1 826 122	55 583	80 997	27 393	42 799	98 417	19 385	110 134	14 549	6 565	56 474	41 135	43 314	59 192	207 503	112 353	221 252	38 379
1991	1 799 998	58 761	82 969	26 932	42 528	99 260	17 846	102 808	14 465	6 025	56 663	39 299	44 171	57 215	201 451	109 957	221 696	38 402
1992	1 783 504	50 825	87 522	25 933	43 108	100 383	16 553	99 451	14 114	5 705	51 648	36 979	44 682	56 089	196 811	112 939	221 028	39 389
1993	1 834 033	60 156	87 849	27 301	44 179	104 075	16 612	99 179	14 300	5 485	52 833	38 525	46 633	56 290	204 181	117 237	227 112	41 737
1994	1 892 066	64 127	85 415	28 163	45 292	110 131	16 475	100 471	15 513	6 103	55 627	38 336	48 219	58 062	209 490	122 865	241 875	45 822
1995	1 955 845	57 586	88 722	29 833	47 377	120 866	17 857	108 733	17 264	5 291	66 021	38 435	49 569	59 863	222 897	134 045	251 308	50 761
1996	1 980 364	66 396	92 370	28 090	44 738	124 609	17 909	111 061	16 366	4 948	64 328	39 511	51 998	61 247	231 813	141 820	227 182	53 396
1997	2 085 143	66 463	92 621	29 492	45 398	127 738	17 553	116 407	17 998	5 494	62 643	41 108	53 194	63 552	233 204	153 449	283 523	54 767
1998	2 183 276	68 191	90 969	29 264	47 946	150 926	17 311	117 991	19 910	5 713	74 385	42 485	53 141	63 515	238 101	173 858	312 726	61 592
1999	2 314 501	71 259	89 958	29 420	50 249	169 579	16 697	121 434	22 023	5 857	83 463	43 573	55 372	64 526	262 149	196 112	340 246	69 677
2000	2 549 185	73 682	97 016	31 860	57 074	200 601	17 625	133 245	26 877	6 472	108 261	48 422	59 359	67 637	297 277	228 274	373 590	82 329
2001	2 680 461	74 198	106 291	30 990	56 122	212 684	18 179	140 504	27 203	5 572	131 288	51 700	57 757	75 693	307 087	247 449	406 466	87 997
2002	2 841 763	81 321	107 694	34 940	56 798	218 803	20 800	166 188	27 816	6 373	128 676	50 745	59 547	73 442	319 985	278 875	436 138	95 231
2003	2 946 289	83 274	114 850	34 567	57 661	222 652	21 631	159 619	27 175	6 558	130 938	51 978	65 047	74 867	326 557	287 636	463 548	104 235
2004	3 083 213	84 124	123 408	33 671	59 559	229 205	23 082	167 977	27 894	7 164	139 393	54 585	67 083	80 783	343 563	297 159	504 911	106 110
2005	3 248 152	84 524	130 684	31 496	64 659	236 887	24 741	171 035	28 182	7 395	150 694	55 153	67 253	91 431	367 192	308 285	551 634	113 533
2006	3 450 011	86 302	133 661	31 287	68 295	253 189	25 628	179 469	30 573	7 563	156 278	58 723	71 189	100 623	396 757	324 507	606 082	124 715
2007	3 636 872	92 426	144 889	31 687	69 671	258 923	28 258	186 278	30 967	7 759	163 072	60 893	72 830	114 318	418 089	337 805	648 075	134 923
2008	3 790 161	102 930	146 111	36 289	77 977	269 503	28 466	207 159	35 622	9 205	153 514	65 108	72 675	122 578	411 466	338 399	706 742	134 811
2009	3 782 045	102 463	141 582	34 805	70 412	260 056	25 216	195 090	33 774	8 856	141 165	59 929	73 423	132 274	411 626	347 402	708 509	134 859
2010	3 929 425	104 064	146 452	35 963	71 782	263 796	26 192	201 882	35 026	8 872	145 049	61 905	75 661	135 653	432 543	358 437	733 541	140 749
2011	4 008 843	104 703	144 433	35 870	70 607	260 547	26 264	207 986	36 424	9 613	147 383	59 590	76 412	138 838	447 316	362 177	763 389	140 582
2012	4 140 715	107 786	147 187	37 552	72 658	267 093	26 593	214 504	37 553	10 328	154 471	60 700	75 258	140 925	467 808	374 957	797 320	153 512

Table 22: Data Statistics for Real Output per Priority Industry

Raw Data	Mean	Median	Minimum	Maximum	Std. Dev.	C.V.	Skewness	Ex. Kurtosis	5% Perc.	95% Perc.	IQ range	Missing Obs
Industry	2 161 800	1 826 100	1 108 000	4 140 700	908 600	0.4203	0.8724	-0.5259	1 123 100	3 993 000	1 346 700	0
SIC_1_	61 026	56 252	28 537	107 790	23 354	0.3827	0.5223	-0.8297	29 269	104 580	40 694	0
SIC_301_304_	89 129	82 969	41 887	147 190	31 495	0.3534	0.5192	-0.6954	42 498	146 380	37 945	0
SIC_311_315_	29 185	28 973	19 940	37 552	4 418	0.1514	-0.1307	-0.3607	20 448	36 352	4 728	5
SIC_323_326_	47 129	44 738	24 005	77 977	15 571	0.3304	0.2699	-0.8940	24 419	72 658	21 651	4
SIC_331_338_	137 940	102 230	40 363	269 500	79 338	0.5752	0.5093	-1.3084	41 554	266 930	147 990	3
SIC_342_	19 403	17 909	13 879	28 466	4 007	0.2065	0.9040	-0.3179	14 049	28 091	4 705	2
SIC_351_353_35~	129 020	116 790	80 149	214 500	38 565	0.2989	0.9112	-0.4264	81 497	207 860	61 346	1
SIC_361_366_	19 320	16 366	6 976	37 553	8 727	0.4517	0.6547	-0.7279	7 132	36 263	13 534	0
SIC_371_373_	6 171	6 182	2 554	10 328	1 760	0.2852	0.0188	0.1798	2 735	9 531	1 873	0
SIC_381_387_	79 565	56 474	35 352	163 070	43 584	0.5478	0.8122	-1.0455	36 473	155 920	85 439	0
SIC_391_392_	34 706	38 336	13 244	65 108	17 721	0.5106	0.2129	-1.4546	13 908	61 703	34 985	0
SIC_41_42_	45 800	44 171	14 779	76 412	18 776	0.4100	0.0633	-1.1012	15 958	75 580	30 263	0
SIC_51_	71 583	60 235	43 402	140 930	26 600	0.3716	1.5892	1.2655	44 931	138 200	18 554	0
SIC_61_64_	251 930	210 200	125 770	467 810	97 996	0.3890	0.8306	-0.6014	135 880	445 840	138 140	2
SIC_71_75_	167 770	112 650	44 469	374 960	106 630	0.6356	0.7536	-0.9888	47 391	361 620	190 830	1
SIC_81_88_	317 940	221 700	132 100	797 320	203 350	0.6396	1.1398	-0.0960	133 660	757 420	266 680	0
SIC_93_96_	59 654	39 177	17 361	153 510	43 293	0.7257	0.8778	-0.7045	17 630	140 720	71 897	0

Table 23: Real Output Industry Contribution per Priority Industry

Year	Industry	SIC [1]	SIC [301 - 309]	SIC [311-319]	SIC [323-329]	SIC [331-339]	SIC [342]	SIC [351, 353-359]	SIC [361-369]	SIC [371-379]	SIC [381-389]	SIC [391-399]	SIC [41-42]	SIC [51]	SIC [61-64]	SIC [71-75]	SIC [81-88]	SIC [93-96]
	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices
1970	100.00%	2.59%	3.82%	0.00%	0.00%	0.00%	0.00%	0.00%	0.63%	0.25%	3.33%	1.62%	1.33%	5.30%	0.00%	0.00%	12.36%	1.70%
1971	100.00%	2.98%	3.72%	0.00%	0.00%	0.00%	0.00%	7.12%	0.63%	0.23%	3.14%	1.25%	1.39%	5.39%	0.00%	3.95%	11.73%	1.65%
1972	100.00%	2.79%	3.86%	0.00%	0.00%	0.00%	1.24%	7.16%	0.64%	0.24%	3.24%	1.27%	1.53%	5.80%	11.21%	4.16%	11.84%	1.56%
1973	100.00%	2.43%	3.89%	0.00%	0.00%	3.51%	1.31%	7.48%	0.73%	0.28%	3.56%	1.22%	1.62%	5.62%	11.46%	4.37%	11.80%	1.48%
1974	100.00%	3.22%	3.81%	0.00%	1.98%	3.28%	1.29%	7.46%	0.77%	0.27%	3.60%	1.13%	1.71%	5.35%	11.85%	4.95%	11.89%	1.47%
1975	100.00%	2.85%	4.30%	1.51%	1.89%	3.56%	1.26%	7.53%	0.98%	0.40%	4.01%	1.24%	1.74%	4.52%	12.18%	5.22%	11.46%	1.45%
1976	100.00%	2.54%	4.45%	1.65%	1.93%	3.80%	1.22%	7.46%	1.03%	0.42%	3.47%	1.25%	1.73%	4.03%	12.15%	5.34%	11.29%	1.54%
1977	100.00%	2.72%	4.59%	1.54%	1.81%	3.91%	1.05%	7.05%	0.91%	0.36%	3.09%	1.30%	1.81%	3.68%	11.71%	5.54%	11.18%	1.65%
1978	100.00%	2.75%	4.65%	1.56%	1.80%	4.24%	1.11%	7.40%	0.91%	0.39%	3.24%	1.12%	1.81%	3.27%	11.41%	5.58%	11.28%	1.64%
1979	100.00%	2.61%	4.71%	1.67%	1.88%	4.20%	1.10%	7.77%	0.89%	0.31%	3.02%	0.95%	1.90%	3.11%	10.85%	5.96%	11.40%	1.62%
1980	100.00%	2.94%	4.67%	1.81%	1.96%	4.27%	1.24%	8.04%	0.96%	0.38%	3.58%	0.97%	1.96%	3.14%	11.40%	6.01%	11.33%	1.56%
1981	100.00%	2.89%	4.31%	1.93%	2.03%	4.59%	1.24%	8.53%	1.10%	0.38%	4.07%	1.06%	2.05%	3.43%	11.53%	6.13%	11.01%	1.60%
1982	100.00%	2.84%	4.51%	1.73%	2.05%	4.44%	1.16%	8.09%	1.06%	0.42%	3.71%	1.00%	2.19%	3.53%	11.50%	5.93%	11.43%	1.74%
1983	100.00%	2.54%	4.94%	1.70%	2.25%	4.59%	1.21%	7.55%	1.11%	0.45%	3.37%	1.04%	2.19%	3.62%	11.81%	5.64%	11.72%	1.86%
1984	100.00%	2.70%	4.62%	1.72%	2.30%	5.03%	1.23%	7.21%	1.04%	0.41%	3.20%	1.04%	2.24%	3.54%	12.36%	5.97%	11.65%	1.82%
1985	100.00%	2.87%	4.64%	1.57%	2.23%	4.84%	1.02%	6.98%	0.95%	0.41%	2.49%	1.04%	2.38%	3.55%	12.21%	6.12%	11.89%	1.99%
1986	100.00%	2.82%	4.60%	1.58%	2.52%	4.81%	1.01%	6.03%	0.74%	0.38%	2.45%	1.27%	2.45%	3.37%	12.20%	6.16%	12.37%	2.14%
1987	100.00%	2.98%	4.32%	1.61%	2.46%	5.17%	0.97%	5.58%	0.79%	0.44%	2.63%	1.31%	2.35%	3.17%	12.12%	5.96%	12.25%	2.13%
1988	100.00%	3.01%	3.97%	1.55%	2.48%	5.28%	1.05%	5.71%	0.82%	0.37%	3.11%	1.46%	2.33%	3.15%	11.96%	6.00%	12.02%	2.13%
1989	100.00%	3.07%	3.97%	1.57%	2.45%	5.27%	1.04%	6.03%	0.80%	0.35%	2.98%	1.68%	2.34%	3.19%	11.47%	6.11%	12.25%	2.14%
1990	100.00%	3.04%	4.44%	1.50%	2.34%	5.39%	1.06%	6.03%	0.80%	0.36%	3.09%	2.25%	2.37%	3.24%	11.36%	6.15%	12.12%	2.10%
1991	100.00%	3.26%	4.61%	1.50%	2.36%	5.51%	0.99%	5.71%	0.80%	0.33%	3.15%	2.18%	2.45%	3.18%	11.19%	6.11%	12.32%	2.13%
1992	100.00%	2.85%	4.91%	1.45%	2.42%	5.63%	0.93%	5.58%	0.79%	0.32%	2.90%	2.07%	2.51%	3.14%	11.04%	6.33%	12.39%	2.21%
1993	100.00%	3.28%	4.79%	1.49%	2.41%	5.67%	0.91%	5.41%	0.78%	0.30%	2.88%	2.10%	2.54%	3.07%	11.13%	6.39%	12.38%	2.28%
1994	100.00%	3.39%	4.51%	1.49%	2.39%	5.82%	0.87%	5.31%	0.82%	0.32%	2.94%	2.03%	2.55%	3.07%	11.07%	6.49%	12.78%	2.42%
1995	100.00%	2.94%	4.54%	1.53%	2.42%	6.18%	0.91%	5.56%	0.88%	0.27%	3.38%	1.97%	2.53%	3.06%	11.40%	6.85%	12.85%	2.60%
1996	100.00%	3.35%	4.66%	1.42%	2.26%	6.29%	0.90%	5.61%	0.83%	0.25%	3.25%	2.00%	2.63%	3.09%	11.71%	7.16%	11.47%	2.70%
1997	100.00%	3.19%	4.44%	1.41%	2.18%	6.13%	0.84%	5.58%	0.86%	0.26%	3.00%	1.97%	2.55%	3.05%	11.18%	7.36%	13.60%	2.63%
1998	100.00%	3.12%	4.17%	1.34%	2.20%	6.91%	0.79%	5.40%	0.91%	0.26%	3.41%	1.95%	2.43%	2.91%	10.91%	7.96%	14.32%	2.82%
1999	100.00%	3.08%	3.89%	1.27%	2.17%	7.33%	0.72%	5.25%	0.95%	0.25%	3.61%	1.88%	2.39%	2.79%	11.33%	8.47%	14.70%	3.01%
2000	100.00%	2.89%	3.81%	1.25%	2.24%	7.87%	0.69%	5.23%	1.05%	0.25%	4.25%	1.90%	2.33%	2.65%	11.66%	8.95%	14.66%	3.23%
2001	100.00%	2.77%	3.97%	1.16%	2.09%	7.93%	0.68%	5.24%	1.01%	0.21%	4.90%	1.93%	2.15%	2.82%	11.46%	9.23%	15.16%	3.28%
2002	100.00%	2.86%	3.79%	1.23%	2.00%	7.70%	0.73%	5.85%	0.98%	0.22%	4.53%	1.79%	2.10%	2.58%	11.26%	9.81%	15.35%	3.35%
2003	100.00%	2.83%	3.90%	1.17%	1.96%	7.56%	0.73%	5.42%	0.92%	0.22%	4.44%	1.76%	2.21%	2.54%	11.08%	9.76%	15.73%	3.54%
2004	100.00%	2.73%	4.00%	1.09%	1.93%	7.43%	0.75%	5.45%	0.90%	0.23%	4.52%	1.77%	2.18%	2.62%	11.14%	9.64%	16.38%	3.44%
2005	100.00%	2.60%	4.02%	0.97%	1.99%	7.29%	0.76%	5.27%	0.87%	0.23%	4.64%	1.70%	2.07%	2.81%	11.30%	9.49%	16.98%	3.50%
2006	100.00%	2.50%	3.87%	0.91%	1.98%	7.34%	0.74%	5.20%	0.89%	0.22%	4.53%	1.70%	2.06%	2.92%	11.50%	9.41%	17.57%	3.61%
2007	100.00%	2.54%	3.98%	0.87%	1.92%	7.12%	0.78%	5.12%	0.85%	0.21%	4.48%	1.67%	2.00%	3.14%	11.50%	9.29%	17.82%	3.71%
2008	100.00%	2.72%	3.86%	0.96%	2.06%	7.11%	0.75%	5.47%	0.94%	0.24%	4.05%	1.72%	1.92%	3.23%	10.86%	8.93%	18.65%	3.56%
2009	100.00%	2.71%	3.74%	0.92%	1.86%	6.88%	0.67%	5.16%	0.89%	0.23%	3.73%	1.58%	1.94%	3.50%	10.88%	9.19%	18.73%	3.57%
2010	100.00%	2.65%	3.73%	0.92%	1.83%	6.71%	0.67%	5.14%	0.89%	0.23%	3.69%	1.58%	1.93%	3.45%	11.01%	9.12%	18.67%	3.58%
2011	100.00%	2.61%	3.60%	0.89%	1.76%	6.50%	0.66%	5.19%	0.91%	0.24%	3.68%	1.49%	1.91%	3.46%	11.16%	9.03%	19.04%	3.51%
2012	100.00%	2.60%	3.55%	0.91%	1.75%	6.45%	0.64%	5.18%	0.91%	0.25%	3.73%	1.47%	1.82%	3.40%	11.30%	9.06%	19.26%	3.71%

Table 24: Real Output Growth Rate per Priority Industry

Year	Industry	SIC [1]	SIC [301-302]	SIC [311-312]	SIC [323-324]	SIC [331-332]	SIC [342]	SIC [351, 353-354]	SIC [361-362]	SIC [371-372]	SIC [381-382]	SIC [391-392]	SIC [41-42]	SIC [51]	SIC [61-64]	SIC [71-75]	SIC [81-88]	SIC [93-96]
	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices
1970																		
1971	1.62%	16.65%	-0.93%						1.87%	-7.47%	-4.22%	-21.44%	5.84%	3.35%			-3.52%	-1.48%
1972	-0.31%	-6.56%	3.54%					0.25%	1.78%	6.80%	2.86%	1.09%	10.09%	7.35%		4.99%	0.57%	-5.84%
1973	4.75%	-8.94%	5.37%				10.96%	9.53%	18.66%	20.46%	15.17%	0.88%	10.39%	1.53%	7.15%	10.05%	4.47%	-0.85%
1974	4.72%	38.98%	2.62%			-2.20%	3.32%	4.31%	10.38%	1.11%	5.81%	-3.80%	10.72%	-0.30%	8.29%	18.68%	5.48%	4.32%
1975	7.06%	-5.22%	20.89%		1.84%	16.18%	4.16%	8.11%	36.96%	57.79%	19.26%	18.20%	8.73%	-9.54%	10.02%	12.86%	3.17%	5.19%
1976	1.76%	-9.34%	5.35%	11.16%	4.21%	8.81%	-1.00%	0.80%	6.56%	7.65%	-11.89%	2.07%	1.48%	-9.30%	1.49%	4.07%	0.23%	8.32%
1977	-0.95%	6.24%	2.11%	-7.63%	-7.37%	1.82%	-15.09%	-6.31%	-12.69%	-16.34%	-11.91%	3.61%	3.40%	-9.54%	-4.51%	2.79%	-1.88%	6.44%
1978	2.42%	3.35%	3.76%	3.40%	1.88%	10.97%	8.34%	7.43%	2.75%	11.28%	7.42%	-12.35%	2.76%	-9.18%	-0.19%	3.08%	3.31%	1.36%
1979	2.67%	-2.71%	4.06%	10.19%	7.28%	1.70%	2.21%	7.79%	0.35%	-18.20%	-4.36%	-12.74%	7.46%	-2.33%	-2.42%	9.81%	3.78%	1.81%
1980	7.01%	20.58%	5.93%	15.85%	11.50%	8.96%	19.81%	10.69%	15.89%	30.52%	27.06%	9.76%	10.44%	8.06%	12.45%	7.86%	6.41%	2.94%
1981	8.38%	6.86%	0.19%	15.44%	12.66%	16.42%	8.94%	15.05%	23.72%	10.19%	23.11%	18.51%	13.48%	18.46%	9.60%	10.48%	5.28%	11.13%
1982	-1.52%	-3.25%	3.03%	-11.65%	-0.85%	-4.74%	-8.02%	-6.57%	-4.89%	8.14%	-10.15%	-7.71%	5.37%	1.36%	-1.80%	-4.75%	2.25%	6.82%
1983	0.39%	-10.47%	9.89%	-1.24%	10.19%	3.70%	4.24%	-6.32%	4.58%	8.72%	-8.89%	4.46%	0.12%	2.93%	3.14%	-4.48%	2.89%	7.32%
1984	6.17%	12.84%	-0.69%	7.36%	8.77%	16.40%	8.59%	1.29%	-0.45%	-3.19%	0.77%	6.26%	8.61%	3.92%	11.09%	12.41%	5.54%	4.24%
1985	-1.31%	5.13%	-0.98%	-10.06%	-4.55%	-5.09%	-18.35%	-4.38%	-9.63%	-2.91%	-23.14%	-0.74%	4.89%	-0.99%	-2.47%	1.21%	0.75%	7.51%
1986	-1.58%	-3.25%	-2.43%	-0.44%	11.54%	-2.15%	-2.26%	-15.01%	-23.08%	-7.52%	-2.99%	19.94%	1.17%	-6.60%	-1.68%	-0.94%	2.39%	5.87%
1987	4.70%	10.66%	-1.50%	6.47%	1.92%	12.55%	0.37%	-3.13%	11.27%	19.21%	12.24%	7.51%	0.80%	-1.66%	3.97%	1.20%	3.70%	4.40%
1988	4.04%	4.90%	-4.39%	0.03%	4.89%	6.20%	12.74%	6.57%	7.71%	-11.42%	23.08%	16.07%	2.92%	3.51%	2.67%	4.83%	2.12%	3.93%
1989	1.97%	3.92%	1.99%	3.05%	0.90%	1.88%	0.56%	7.61%	0.24%	-2.59%	-2.23%	17.58%	2.36%	3.35%	-2.20%	3.77%	3.86%	2.36%
1990	-0.48%	-1.19%	11.07%	-4.62%	-4.86%	1.75%	1.82%	-0.46%	-1.42%	1.02%	3.15%	33.45%	0.94%	1.01%	-1.39%	0.22%	-1.54%	-2.04%
1991	-1.43%	5.72%	2.44%	-1.68%	-0.63%	0.86%	-7.94%	-6.65%	-0.58%	-8.22%	0.34%	-4.46%	1.98%	-3.34%	-2.92%	-2.13%	0.20%	0.06%
1992	-0.92%	-13.51%	5.49%	-3.71%	1.36%	1.13%	-7.25%	-3.27%	-2.42%	-5.31%	-8.85%	-5.90%	1.16%	-1.97%	-2.30%	2.71%	-0.30%	2.57%
1993	2.83%	18.36%	0.37%	5.28%	2.49%	3.68%	0.36%	-0.27%	1.32%	-3.86%	2.29%	4.18%	4.37%	0.36%	3.74%	3.81%	2.75%	5.96%
1994	3.16%	6.60%	-2.77%	3.15%	2.52%	5.82%	-0.82%	1.30%	8.48%	11.26%	5.29%	-0.49%	3.40%	3.15%	2.60%	4.80%	6.50%	9.79%
1995	3.37%	-10.20%	3.87%	5.93%	4.60%	9.75%	8.39%	8.22%	11.29%	-13.30%	18.69%	0.26%	2.80%	3.10%	6.40%	9.10%	3.90%	10.78%
1996	1.25%	15.30%	4.11%	-5.84%	-5.57%	3.10%	0.29%	2.14%	-5.20%	-6.48%	-2.56%	2.80%	4.90%	2.31%	4.00%	5.80%	-9.60%	5.19%
1997	5.29%	0.10%	0.27%	4.99%	1.47%	2.51%	-1.99%	4.81%	9.97%	11.02%	-2.62%	4.04%	2.30%	3.76%	0.60%	8.20%	24.80%	2.57%
1998	4.71%	2.60%	-1.78%	-0.77%	5.61%	18.15%	-1.38%	1.36%	10.62%	3.99%	18.74%	3.35%	-0.10%	-0.06%	2.10%	13.30%	10.30%	12.46%
1999	6.01%	4.50%	-1.11%	0.53%	4.80%	12.36%	-3.54%	2.92%	10.61%	2.51%	12.20%	2.56%	4.20%	1.59%	10.10%	12.80%	8.80%	13.13%
2000	10.14%	3.40%	7.85%	8.29%	13.58%	18.29%	5.56%	9.73%	22.04%	10.50%	29.71%	11.13%	7.20%	4.82%	13.40%	16.40%	9.80%	18.16%
2001	5.15%	0.70%	9.56%	-2.73%	-1.67%	6.02%	3.14%	5.45%	1.21%	-13.89%	21.27%	6.77%	-2.70%	11.91%	3.30%	8.40%	8.80%	6.88%
2002	6.02%	9.60%	1.32%	12.74%	1.20%	2.88%	14.42%	18.28%	2.25%	14.37%	-1.99%	-1.85%	3.10%	-2.97%	4.20%	12.70%	7.30%	8.22%
2003	3.68%	2.40%	6.64%	-1.07%	1.52%	1.76%	4.00%	-3.95%	-2.30%	2.90%	1.76%	2.43%	9.24%	1.94%	2.05%	3.14%	6.28%	9.46%
2004	4.65%	1.02%	7.45%	-2.59%	3.29%	2.94%	6.71%	5.24%	2.65%	3.24%	6.46%	5.02%	3.13%	7.90%	5.21%	3.31%	8.92%	1.80%
2005	5.35%	0.48%	5.90%	-6.46%	8.56%	3.35%	7.19%	1.82%	1.03%	3.22%	8.11%	1.04%	0.25%	13.18%	6.88%	3.74%	9.25%	7.00%
2006	6.21%	2.10%	2.28%	-0.66%	5.62%	6.88%	3.59%	4.93%	8.49%	2.27%	3.71%	6.47%	5.85%	10.05%	8.05%	5.26%	9.87%	9.85%
2007	5.42%	7.10%	8.40%	1.28%	2.01%	2.26%	10.26%	3.79%	1.29%	2.59%	4.35%	3.70%	2.31%	13.61%	5.38%	4.10%	6.93%	8.19%
2008	4.21%	11.36%	0.84%	14.52%	11.92%	4.09%	0.74%	11.21%	15.03%	18.64%	-5.86%	6.92%	-0.21%	7.23%	-1.58%	0.18%	9.05%	-0.08%
2009	-0.21%	-0.45%	-3.10%	-4.09%	-9.70%	-3.51%	-11.42%	-5.83%	-5.19%	-3.80%	-8.04%	-7.95%	1.03%	7.91%	0.04%	2.66%	0.25%	0.04%
2010	3.90%	1.56%	3.44%	3.33%	1.95%	1.44%	3.87%	3.48%	3.71%	0.18%	2.75%	3.30%	3.05%	2.55%	5.08%	3.18%	3.53%	4.37%
2011	2.02%	0.61%	-1.38%	-0.26%	-1.64%	-1.23%	0.28%	3.02%	3.99%	8.35%	1.61%	-3.74%	0.99%	2.35%	3.42%	1.04%	4.07%	-0.12%
2012	3.29%	2.95%	1.91%	4.69%	2.91%	2.51%	1.25%	3.13%	3.10%	7.44%	4.81%	1.86%	-1.51%	1.50%	4.58%	3.53%	4.44%	9.20%

Table 25: Data Statistics for Real Output Growth Rate per Priority Industry

Growth Rate	Mean	Median	Minimum	Maximum	Std. Dev.	C.V.	Skewness	Ex. Kurtosis	5% Perc.	95% Perc.	IQ range	Missing Obs
Industry	0.0323	0.0352	-0.0158	0.1014	0.0291	0.9026	-0.0098	-0.6116	-0.0151	0.0818	0.0427	1
SIC_1_	0.0361	0.0277	-0.1351	0.3898	0.0958	2.6552	1.1406	2.9315	-0.1043	0.2025	0.0849	1
SIC_301_304_	0.0312	0.0253	-0.0439	0.2089	0.0472	1.5131	1.2840	3.0204	-0.0305	0.1089	0.0634	1
SIC_311_315_	0.0195	0.0053	-0.1165	0.1585	0.0690	3.5356	0.2685	-0.4521	-0.1022	0.1548	0.0886	6
SIC_323_326_	0.0306	0.0225	-0.0970	0.1358	0.0556	1.8172	-0.0544	-0.2394	-0.0748	0.1271	0.0552	5
SIC_331_338_	0.0508	0.0310	-0.0509	0.1829	0.0626	1.2312	0.6452	-0.3584	-0.0474	0.1815	0.0727	4
SIC_342_	0.0193	0.0201	-0.1835	0.1981	0.0763	3.9634	-0.4070	0.6720	-0.1490	0.1434	0.0835	3
SIC_351_353_35~	0.0264	0.0302	-0.1501	0.1828	0.0657	2.4891	-0.1623	0.2903	-0.0664	0.1467	0.0932	2
SIC_361_366_	0.0457	0.0270	-0.2308	0.3697	0.1020	2.2324	0.4631	1.9674	-0.1223	0.2346	0.1091	1
SIC_371_373_	0.0397	0.0275	-0.1820	0.5779	0.1348	3.3934	1.4743	4.4313	-0.1597	0.2901	0.1449	1
SIC_381_387_	0.0410	0.0281	-0.2314	0.2971	0.1168	2.8470	0.2902	-0.2398	-0.1190	0.2647	0.1551	1
SIC_391_392_	0.0338	0.0305	-0.2144	0.3345	0.0972	2.8736	0.4230	1.5510	-0.1268	0.1972	0.0782	1
SIC_41_42_	0.0402	0.0307	-0.0270	0.1348	0.0375	0.9338	0.6495	-0.3138	-0.0132	0.1067	0.0507	1
SIC_51_	0.0229	0.0233	-0.0954	0.1846	0.0624	2.7206	0.1456	0.2916	-0.0950	0.1355	0.0658	1
SIC_61_64_	0.0344	0.0336	-0.0451	0.1340	0.0463	1.3475	0.3023	-0.7335	-0.0289	0.1239	0.0785	3
SIC_71_75_	0.0547	0.0407	-0.0475	0.1868	0.0534	0.9759	0.4320	-0.1600	-0.0425	0.1609	0.0677	2
SIC_81_88_	0.0441	0.0388	-0.0960	0.2480	0.0519	1.1774	0.9489	4.7650	-0.0327	0.1024	0.0525	1
SIC_93_96_	0.0522	0.0519	-0.0584	0.1816	0.0471	0.9025	0.1942	0.2223	-0.0195	0.1303	0.0644	1

Table 26: Correlation Matrix for Growth Rates of Real Output per Priority Industry

Industries	Correlation																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	1.000	-0.292	0.304	0.043	-0.001	0.160	0.198	0.045	-0.015	0.110	-0.071	0.284	0.119	0.277	0.334	-0.004	0.005
2	-0.292	1.000	-0.081	0.019	0.155	0.259	0.164	0.346	0.429	0.203	0.266	0.115	-0.051	0.230	0.085	-0.030	0.007
3	0.304	-0.081	1.000	0.616	0.523	0.592	0.672	0.647	0.452	0.381	0.129	0.332	0.109	0.420	0.473	0.313	0.095
4	0.043	0.019	0.616	1.000	0.512	0.560	0.334	0.427	0.250	0.438	0.233	0.293	0.267	0.500	0.292	0.410	0.357
5	-0.001	0.155	0.523	0.512	1.000	0.438	0.448	0.691	0.379	0.695	0.294	0.260	0.063	0.619	0.566	0.247	0.474
6	0.160	0.259	0.592	0.560	0.438	1.000	0.679	0.481	0.338	0.657	0.241	0.312	0.347	0.638	0.390	0.267	0.043
7	0.198	0.164	0.672	0.334	0.448	0.679	1.000	0.675	0.355	0.530	0.088	0.307	0.311	0.500	0.609	0.361	0.101
8	0.045	0.346	0.647	0.427	0.691	0.481	0.675	1.000	0.695	0.668	0.204	0.371	0.182	0.649	0.547	0.370	0.202
9	-0.015	0.429	0.452	0.250	0.379	0.338	0.355	0.695	1.000	0.316	0.237	0.266	-0.059	0.440	0.168	0.268	0.000
10	0.110	0.203	0.381	0.438	0.695	0.657	0.530	0.668	0.316	1.000	0.367	0.251	0.331	0.696	0.555	0.316	0.300
11	-0.071	0.266	0.129	0.233	0.294	0.241	0.088	0.204	0.237	0.367	1.000	0.006	0.136	0.204	0.035	0.112	0.155
12	0.284	0.115	0.332	0.293	0.260	0.312	0.307	0.371	0.266	0.251	0.006	1.000	0.115	0.504	0.480	-0.055	-0.015
13	0.119	-0.051	0.109	0.267	0.063	0.347	0.311	0.182	-0.059	0.331	0.136	0.115	1.000	0.401	0.073	0.330	0.077
14	0.277	0.230	0.420	0.500	0.619	0.638	0.500	0.649	0.440	0.696	0.204	0.504	0.401	1.000	0.645	0.297	0.429
15	0.334	0.085	0.473	0.292	0.566	0.390	0.609	0.547	0.168	0.555	0.035	0.480	0.073	0.645	1.000	0.348	0.356
16	-0.004	-0.030	0.313	0.410	0.247	0.267	0.361	0.370	0.268	0.316	0.112	-0.055	0.330	0.297	0.348	1.000	0.293
17	0.005	0.007	0.095	0.357	0.474	0.043	0.101	0.202	0.000	0.300	0.155	-0.015	0.077	0.429	0.356	0.293	1.000

Table 27: Optimised Portfolio Growth Rate per Priority Industry

Year	Industry	SIC [1]	SIC [301 - 304]	SIC [311-315]	SIC [323-326]	SIC [331-338]	SIC [342]	C [351, 353-357]	SIC [361-366]	SIC [371-373]	SIC [381-387]	SIC [391-392]	SIC [41-42]	SIC [51]	SIC [61-64]	SIC [71-75]	SIC [81-88]	SIC [93-96]
	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices	Rm 2005-prices
1970																		
1971	1.70%	4.01%	1.53%						4.39%	17.53%	2.97%	-4.61%	8.37%	6.66%			3.19%	3.18%
1972	1.16%	-2.96%	3.18%					2.68%	4.13%	16.42%	4.94%	2.94%	9.42%	7.98%		5.17%	4.29%	1.78%
1973	3.79%	-3.35%	4.90%				4.77%	6.80%	9.39%	20.03%	9.27%	3.46%	8.09%	12.66%	4.80%	6.92%	5.45%	3.43%
1974	3.73%	12.25%	4.68%			3.16%	3.57%	6.28%	9.18%	9.68%	6.36%	3.75%	8.56%	11.21%	4.61%	10.20%	5.80%	2.92%
1975	4.18%	-2.25%	11.15%		1.92%	7.15%	2.12%	7.54%	15.18%	26.65%	10.24%	5.37%	10.85%	0.48%	4.25%	8.70%	5.18%	3.18%
1976	1.55%	-3.63%	5.13%	4.96%	2.42%	5.96%	-0.88%	2.40%	3.48%	7.89%	-0.73%	1.49%	8.16%	-6.52%	1.40%	3.63%	4.30%	3.81%
1977	-0.32%	2.18%	1.82%	-4.10%	-3.33%	0.91%	-7.98%	-3.27%	-7.69%	-12.52%	-8.44%	0.58%	5.36%	-13.09%	-0.24%	2.43%	3.54%	2.53%
1978	1.26%	1.59%	1.82%	0.51%	-0.56%	7.40%	0.96%	2.62%	-2.61%	-0.55%	4.08%	-2.26%	4.44%	-10.91%	1.70%	2.75%	4.91%	0.93%
1979	2.13%	-0.80%	3.10%	4.62%	2.85%	3.23%	2.09%	4.87%	-0.51%	-7.74%	-0.18%	2.10%	6.72%	2.01%	1.25%	4.66%	4.73%	2.07%
1980	4.30%	5.72%	4.33%	8.15%	5.88%	7.50%	10.15%	6.20%	9.11%	26.14%	13.79%	11.98%	8.38%	14.89%	6.24%	4.44%	5.78%	1.89%
1981	4.54%	0.67%	1.75%	8.14%	6.34%	10.54%	5.45%	10.00%	11.31%	2.26%	13.78%	12.00%	10.87%	17.29%	5.16%	5.87%	6.30%	3.46%
1982	0.41%	-2.13%	1.64%	-3.87%	0.44%	2.31%	-0.27%	0.02%	-4.16%	5.99%	0.42%	-0.75%	10.20%	5.68%	0.70%	0.12%	5.98%	-2.38%
1983	0.18%	-4.07%	3.46%	-3.92%	3.97%	0.68%	0.68%	-6.87%	-3.18%	-5.72%	-8.53%	1.97%	7.03%	1.24%	1.47%	-1.54%	5.99%	-1.32%
1984	2.66%	3.64%	1.49%	0.32%	4.79%	6.76%	6.35%	-1.57%	-2.69%	0.19%	-1.20%	2.59%	7.32%	1.57%	4.33%	4.54%	6.73%	1.62%
1985	-0.17%	1.58%	0.81%	-4.95%	-0.22%	-0.95%	-9.83%	-4.00%	-8.00%	-10.68%	-12.27%	-0.50%	3.89%	-1.34%	-0.63%	0.24%	5.39%	6.30%
1986	0.12%	-0.74%	0.49%	0.88%	3.32%	-0.64%	-3.38%	-5.44%	-8.25%	-0.88%	-3.59%	11.04%	-2.01%	-1.85%	-0.52%	-1.65%	5.78%	8.69%
1987	2.34%	2.95%	1.64%	4.80%	1.47%	7.59%	2.07%	-0.44%	4.86%	9.35%	2.78%	8.79%	-4.37%	0.13%	2.83%	-1.87%	6.91%	7.35%
1988	2.16%	0.62%	0.05%	1.11%	3.33%	3.80%	4.17%	1.78%	4.93%	-0.27%	10.06%	-0.82%	-0.82%	2.53%	3.76%	0.69%	7.41%	5.52%
1989	1.34%	1.22%	2.04%	-0.84%	1.45%	1.93%	1.09%	1.96%	4.38%	6.48%	1.37%	7.99%	-2.49%	2.73%	1.45%	0.44%	7.98%	4.08%
1990	-0.09%	-0.26%	4.57%	-4.84%	0.07%	1.22%	1.20%	-0.64%	2.79%	5.43%	1.53%	12.14%	-2.42%	-0.23%	-0.19%	-1.14%	5.60%	1.90%
1991	-0.94%	1.91%	0.49%	-4.79%	1.23%	0.80%	-2.92%	-5.03%	2.31%	2.58%	-1.62%	-0.48%	-2.29%	-3.41%	-1.45%	-1.84%	5.29%	1.70%
1992	-0.83%	-4.42%	1.81%	-5.80%	1.64%	-0.04%	-1.97%	-4.67%	-0.11%	1.23%	-5.92%	-1.11%	-2.88%	-2.98%	-1.11%	-1.22%	4.92%	2.85%
1993	0.43%	5.87%	-1.17%	-0.79%	-0.04%	0.05%	-2.97%	-2.53%	-2.63%	-1.60%	-2.53%	-2.22%	-2.44%	0.24%	-2.44%	-3.43%	5.95%	5.30%
1994	0.97%	2.03%	-3.79%	1.53%	-0.22%	-3.09%	-3.00%	0.81%	2.42%	3.50%	5.72%	-0.06%	-1.75%	1.08%	0.16%	-1.32%	7.17%	6.31%
1995	1.58%	-3.47%	2.00%	5.06%	1.40%	1.09%	2.07%	5.15%	1.39%	-3.77%	14.18%	2.00%	0.57%	-1.49%	3.58%	3.04%	6.52%	7.03%
1996	0.91%	4.66%	3.99%	4.06%	-3.56%	-2.68%	2.65%	2.49%	-7.68%	-1.23%	3.93%	6.06%	2.38%	-3.04%	2.45%	1.77%	2.40%	5.14%
1997	1.90%	-0.51%	-2.47%	-1.26%	-1.32%	-1.45%	-3.30%	0.09%	0.68%	-3.21%	-2.24%	-0.55%	1.13%	-3.79%	1.19%	0.18%	13.55%	4.48%
1998	1.00%	0.12%	-3.23%	-8.33%	0.56%	7.62%	-12.60%	-3.14%	2.79%	13.77%	6.22%	-3.43%	3.70%	-6.54%	3.47%	-1.07%	7.85%	7.69%
1999	1.64%	0.61%	-0.61%	-0.51%	4.81%	0.78%	-12.06%	-3.44%	-0.53%	0.46%	5.87%	0.05%	3.06%	-8.90%	6.94%	1.19%	6.55%	8.20%
2000	3.18%	0.08%	-0.63%	2.98%	6.81%	4.96%	-3.77%	0.30%	5.15%	-3.86%	12.18%	5.10%	-0.56%	-2.21%	5.07%	2.45%	7.56%	10.25%
2001	0.73%	-5.83%	1.89%	-2.82%	-1.56%	-0.60%	-1.50%	2.86%	-3.06%	-13.57%	8.65%	1.84%	-1.66%	1.62%	1.32%	-0.38%	8.73%	6.28%
2002	2.43%	0.23%	-0.47%	5.04%	0.65%	1.58%	3.08%	7.41%	0.36%	-2.48%	-1.77%	2.99%	0.10%	-3.42%	1.26%	2.25%	8.23%	7.04%
2003	1.14%	-3.20%	-4.84%	-1.37%	3.71%	6.91%	2.58%	1.71%	-3.39%	-8.39%	-1.81%	1.42%	-1.50%	-8.16%	0.06%	1.67%	5.25%	6.38%
2004	1.96%	-4.32%	3.39%	-3.42%	4.41%	2.59%	10.26%	4.18%	1.07%	-2.20%	2.13%	0.10%	2.66%	-6.21%	4.13%	2.21%	5.06%	8.21%
2005	2.34%	-3.00%	4.86%	-8.16%	2.78%	5.20%	13.82%	0.61%	3.06%	3.49%	3.32%	0.43%	4.54%	20.85%	5.14%	2.84%	1.17%	3.18%
2006	3.48%	-0.67%	-1.52%	-2.62%	5.70%	3.55%	1.08%	4.01%	4.19%	1.94%	1.71%	1.09%	3.19%	7.39%	4.32%	1.14%	7.45%	1.93%
2007	2.97%	-3.82%	0.42%	-2.54%	-0.29%	0.56%	0.92%	2.25%	0.59%	-4.92%	-0.20%	2.09%	4.36%	3.94%	4.06%	3.94%	5.83%	-0.38%
2008	1.54%	-7.57%	1.11%	-0.96%	5.93%	2.14%	-2.87%	3.20%	5.98%	1.68%	-2.07%	-4.69%	4.83%	0.21%	-0.78%	0.84%	5.29%	-0.84%
2009	-2.60%	-11.20%	-1.99%	-9.72%	-2.32%	-4.91%	-16.19%	-5.02%	-7.35%	-1.31%	-9.16%	-10.11%	0.58%	-5.05%	-2.60%	-0.36%	-3.15%	0.18%
2010	0.12%	-6.00%	-0.70%	-2.23%	-1.28%	-1.33%	-3.15%	0.43%	-1.87%	-1.02%	-2.09%	-4.39%	2.49%	-5.20%	1.19%	1.21%	-0.33%	0.65%
2011	1.60%	-0.36%	-2.75%	-3.81%	-1.56%	-0.89%	-0.78%	0.62%	6.29%	3.99%	0.04%	-1.40%	3.02%	0.58%	1.82%	1.14%	2.99%	0.74%
2012	1.92%	5.33%	0.29%	-1.29%	-0.74%	1.19%	0.70%	1.55%	2.09%	2.72%	1.74%	1.14%	1.97%	-0.83%	2.43%	3.36%	2.02%	3.28%

Table 28: Data Statistics for Optimised Portfolio Growth Rate per Priority Industry

Growth Rate	Mean	Median	Minimum	Maximum	Std. Dev.	C.V.	Skewness	Ex. Kurtosi	5% Perc.	95% Perc.	IQ range	Missing Obs
Industry	0.0153	0.0156	-0.0260	0.0454	0.0152	0.9917	-0.1351	0.1248	-0.0092	0.0428	0.0194	1
SIC_1_	-0.0041	-0.0031	-0.1120	0.1225	0.0418	10.1470	0.2589	1.1354	-0.0733	0.0585	0.0532	1
SIC_301_304_	0.0132	0.0159	-0.0484	0.1115	0.0294	2.2162	0.5348	1.5716	-0.0371	0.0510	0.0385	1
SIC_311_315_	-0.0083	-0.0126	-0.0972	0.0815	0.0441	5.3008	0.1957	-0.4758	-0.0847	0.0814	0.0615	6
SIC_323_326_	0.0160	0.0143	-0.0356	0.0681	0.0277	1.7279	0.1503	-0.8573	-0.0334	0.0636	0.0413	5
SIC_331_338_	0.0238	0.0158	-0.0491	0.1054	0.0353	1.4846	0.3038	-0.5449	-0.0309	0.0762	0.0524	4
SIC_342_	-0.0008	0.0094	-0.1619	0.1382	0.0594	70.4690	-0.4747	1.0040	-0.1258	0.1025	0.0561	3
SIC_351_353_35~	0.0108	0.0155	-0.0687	0.1000	0.0401	3.7137	-0.0007	-0.5698	-0.0540	0.0753	0.0588	2
SIC_361_366_	0.0138	0.0174	-0.0825	0.1518	0.0539	3.9113	0.1521	-0.0936	-0.0795	0.1102	0.0714	1
SIC_371_373_	0.0244	0.0085	-0.1357	0.2665	0.0915	3.7518	0.8801	0.7431	-0.1224	0.2522	0.0889	1
SIC_381_387_	0.0200	0.0162	-0.1227	0.1418	0.0630	3.1557	0.0449	-0.2416	-0.0907	0.1379	0.0773	1
SIC_391_392_	0.0219	0.0166	-0.1011	0.1214	0.0488	2.2296	0.3227	0.2729	-0.0468	0.1200	0.0460	1
SIC_41_42_	0.0313	0.0304	-0.0437	0.1087	0.0433	1.3852	0.1500	-1.1116	-0.0282	0.1075	0.0809	1
SIC_51_	0.0060	-0.0005	-0.1309	0.2085	0.0724	12.1020	0.8144	0.6894	-0.1061	0.1693	0.0654	1
SIC_61_64_	0.0213	0.0159	-0.0260	0.0694	0.0231	1.0849	0.0926	-0.8592	-0.0143	0.0618	0.0404	3
SIC_71_75_	0.0176	0.0121	-0.0343	0.1020	0.0292	1.6595	0.8276	0.6713	-0.0186	0.0853	0.0357	2
SIC_81_88_	0.0542	0.0569	-0.0315	0.1355	0.0264	0.4870	-0.4415	3.0955	-0.0011	0.0866	0.0215	1
SIC_93_96_	0.0373	0.0323	-0.0238	0.1025	0.0297	0.7969	0.1403	-0.6481	-0.0125	0.0862	0.0454	1

Table 29: Correlation Matrix for Growth Rates of the Optimised Portfolio per Priority Industry

Industries	Correlation																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	1.000	-0.292	0.304	0.043	-0.001	0.160	0.198	0.045	-0.015	0.110	-0.071	0.284	0.119	0.277	0.334	-0.004	0.005
2	-0.292	1.000	-0.081	0.019	0.155	0.259	0.164	0.346	0.429	0.203	0.266	0.115	-0.051	0.230	0.085	-0.030	0.007
3	0.304	-0.081	1.000	0.616	0.523	0.592	0.672	0.647	0.452	0.381	0.129	0.332	0.109	0.420	0.473	0.313	0.095
4	0.043	0.019	0.616	1.000	0.512	0.560	0.334	0.427	0.250	0.438	0.233	0.293	0.267	0.500	0.292	0.410	0.357
5	-0.001	0.155	0.523	0.512	1.000	0.438	0.448	0.691	0.379	0.695	0.294	0.260	0.063	0.619	0.566	0.247	0.474
6	0.160	0.259	0.592	0.560	0.438	1.000	0.679	0.481	0.338	0.657	0.241	0.312	0.347	0.638	0.390	0.267	0.043
7	0.198	0.164	0.672	0.334	0.448	0.679	1.000	0.675	0.355	0.530	0.088	0.307	0.311	0.500	0.609	0.361	0.101
8	0.045	0.346	0.647	0.427	0.691	0.481	0.675	1.000	0.695	0.668	0.204	0.371	0.182	0.649	0.547	0.370	0.202
9	-0.015	0.429	0.452	0.250	0.379	0.338	0.355	0.695	1.000	0.316	0.237	0.266	-0.059	0.440	0.168	0.268	0.000
10	0.110	0.203	0.381	0.438	0.695	0.657	0.530	0.668	0.316	1.000	0.367	0.251	0.331	0.696	0.555	0.316	0.300
11	-0.071	0.266	0.129	0.233	0.294	0.241	0.088	0.204	0.237	0.367	1.000	0.006	0.136	0.204	0.035	0.112	0.155
12	0.284	0.115	0.332	0.293	0.260	0.312	0.307	0.371	0.266	0.251	0.006	1.000	0.115	0.504	0.480	-0.055	-0.015
13	0.119	-0.051	0.109	0.267	0.063	0.347	0.311	0.182	-0.059	0.331	0.136	0.115	1.000	0.401	0.073	0.330	0.077
14	0.277	0.230	0.420	0.500	0.619	0.638	0.500	0.649	0.440	0.696	0.204	0.504	0.401	1.000	0.645	0.297	0.429
15	0.334	0.085	0.473	0.292	0.566	0.390	0.609	0.547	0.168	0.555	0.035	0.480	0.073	0.645	1.000	0.348	0.356
16	-0.004	-0.030	0.313	0.410	0.247	0.267	0.361	0.370	0.268	0.316	0.112	-0.055	0.330	0.297	0.348	1.000	0.293
17	0.005	0.007	0.095	0.357	0.474	0.043	0.101	0.202	0.000	0.300	0.155	-0.015	0.077	0.429	0.356	0.293	1.000

Table 30: Optimum Portfolio (Scenario 3) Comparison to IDC Approved Application Data (2010-2014)

Industries	SIC Code Range	Priority Industry	Unconstrained Global	Constrained Global	Maximize	Minimize	Maximize	Maximize	IDC	IDC re-weight
			Minimum Variance	Minimum Variance	Utility	Standard Deviation	Expected Return	Slope of the CAL	Approved Application (2010-2014) Proportion	Approved Applications (2010-2014)
			Weights	Weights	Weights	Weights	Weights	Weights		Weights
1	1	Agriculture, forestry and fishing	11.65%	3.06%	2.00%	3.06%	2.00%	2.00%	3.77%	4.75%
2	301 - 304	Food	33.59%	18.71%	2.00%	18.71%	2.00%	2.00%	1.45%	1.82%
3	311-315	Textiles and wearing apparel	-7.87%	2.00%	2.00%	2.00%	2.00%	2.00%	2.53%	3.18%
4	323-326	Paper and paper products; printing, publishing and recorded media	23.68%	8.94%	2.00%	8.94%	2.00%	2.00%	0.32%	0.41%
5	331-338	Coke, refined petroleum; basic and other chemicals; man-made fibres; plastic products	0.64%	2.00%	14.00%	2.00%	2.00%	2.00%	4.86%	6.12%
6	342	Non-metallic minerals	-10.29%	2.00%	2.00%	2.00%	2.00%	2.00%	1.44%	1.81%
7	351, 353-359	Basic iron and steel; metal products excluding machinery; machinery and equipment	26.04%	2.00%	2.00%	2.00%	2.00%	2.00%	9.41%	11.85%
8	361-366	Electrical machinery	-11.00%	2.00%	2.00%	2.00%	2.00%	2.00%	0.59%	0.74%
9	371-373	Television, radio and communication equipment	1.22%	2.00%	2.00%	2.00%	14.00%	2.00%	0.56%	0.70%
10	381-387	Motor vehicles, parts and accessories; other transport equipment	-13.01%	2.00%	2.00%	2.00%	2.00%	2.00%	4.28%	5.38%
11	391-392	Furniture and other industries	-8.35%	2.00%	2.00%	2.00%	2.00%	2.00%	0.45%	0.57%
12	41-42	Electricity, gas and steam; water supply	-9.01%	7.28%	20.00%	7.28%	20.00%	20.00%	37.49%	47.20%
13	51	Construction	2.81%	2.00%	2.00%	2.00%	2.00%	2.00%	0.00%	0.00%
14	61-64	Wholesale and retail trade; hotels and restaurants	27.68%	2.00%	2.00%	2.00%	2.00%	14.00%	2.25%	2.83%
15	71-75	Transport and storage; communication	-1.37%	2.00%	2.00%	2.00%	2.00%	2.00%	4.08%	5.13%
16	81-88	Finance and insurance	19.98%	20.00%	20.00%	20.00%	20.00%	20.00%	3.27%	4.11%
17	93-96	Other services	13.59%	20.00%	20.00%	20.00%	20.00%	20.00%	2.69%	3.38%
Σw_i			100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	79.43%	100.00%
$E(r_i)$			2.47%	2.74%	3.09%	2.74%	3.10%	3.06%		
σ_i			1.20%	1.76%	1.95%	1.76%	2.41%	1.86%		
$E(U)$			0.0243	0.0264	0.0298	0.0264	0.0292	0.0296		
Prob ($r < 0$)			1.94%	5.98%	5.69%	5.98%	9.93%	5.03%		
Slope of the CAL			0.7878	0.6861	0.7982	0.6861	0.6506	0.8210		

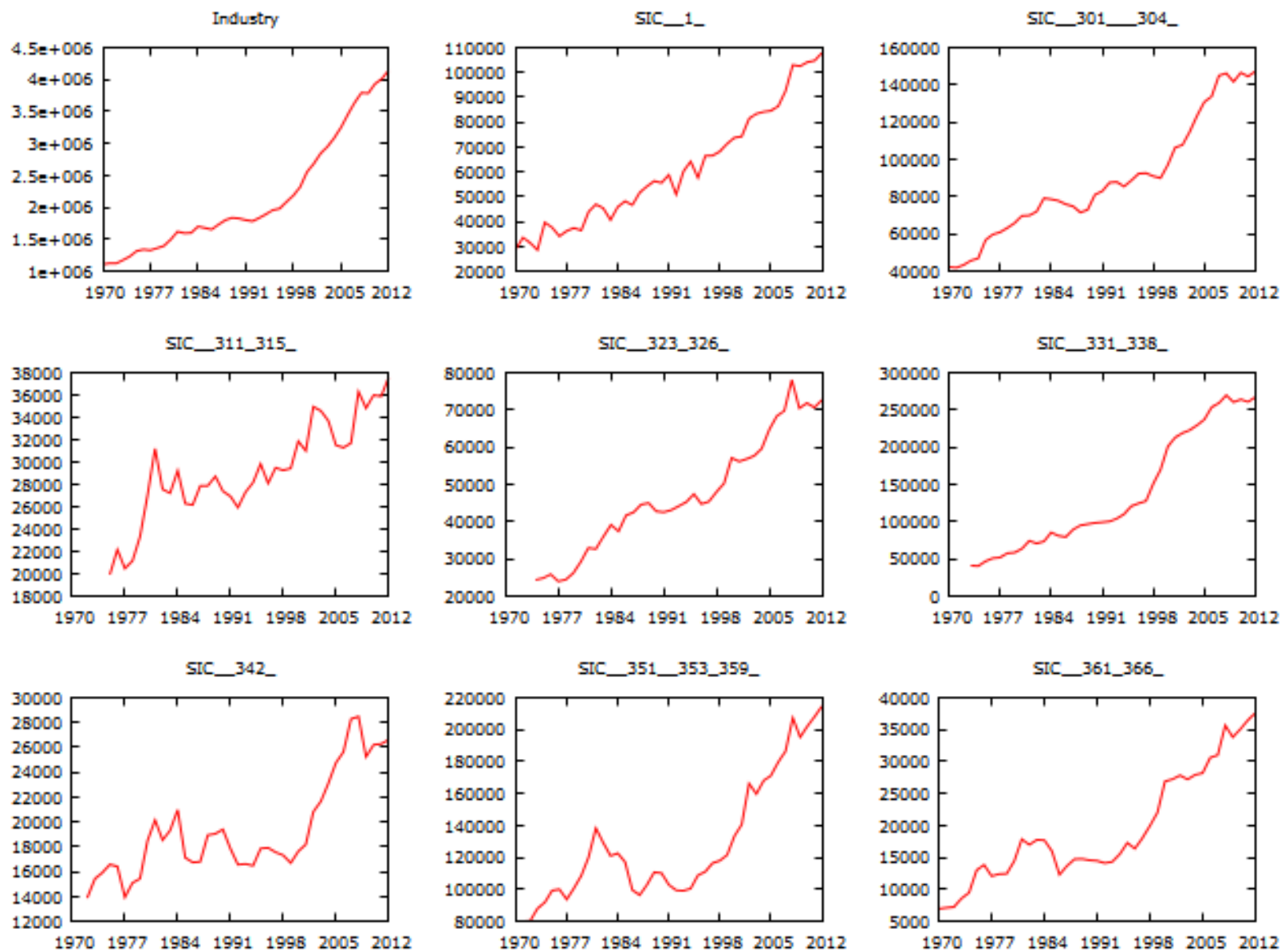
Table 31: Difference between IDC Approved Applications from each Markowitz Optimum Portfolio (Scenario 3) Weighting Measure

Industries	SIC Code Range	Priority Industry	IDC Capital Investment Difference to the Optimum Portfolio Weightings					
			Unconstrained Global Minimum Variance	Constrained Global Minimum Variance	Maximize Utility	Minimize Standard Deviation	Maximize Expected Return	Maximize Slope of the CAL
			Weights	Weights	Weights	Weights	Weights	Weights
1	1	Agriculture, forestry and fishing	-6.90%	1.69%	2.75%	1.69%	2.75%	2.75%
2	301 - 304	Food	-31.77%	-16.89%	-0.18%	-16.89%	-0.18%	-0.18%
3	311-315	Textiles and wearing apparel	11.05%	1.18%	1.18%	1.18%	1.18%	1.18%
4	323-326	Paper and paper products; printing, publishing and recorded media	-23.28%	-8.54%	-1.59%	-8.54%	-1.59%	-1.59%
5	331-338	Coke, refined petroleum; basic and other chemicals; man-made fibres; plastic products	5.48%	4.12%	-7.88%	4.12%	4.12%	4.12%
6	342	Non-metallic minerals	12.10%	-0.19%	-0.19%	-0.19%	-0.19%	-0.19%
7	351, 353-359	Basic iron and steel; metal products excluding machinery; machinery and equipment	-14.19%	9.85%	9.85%	9.85%	9.85%	9.85%
8	361-366	Electrical machinery	11.74%	-1.26%	-1.26%	-1.26%	-1.26%	-1.26%
9	371-373	Television, radio and communication equipment	-0.52%	-1.30%	-1.30%	-1.30%	-13.30%	-1.30%
10	381-387	Motor vehicles, parts and accessories; other transport equipment	18.39%	3.38%	3.38%	3.38%	3.38%	3.38%
11	391-392	Furniture and other industries	8.92%	-1.43%	-1.43%	-1.43%	-1.43%	-1.43%
12	41-42	Electricity, gas and steam; water supply	56.22%	39.93%	27.20%	39.93%	27.20%	27.20%
13	51	Construction	-2.81%	-2.00%	-2.00%	-2.00%	-2.00%	-2.00%
14	61-64	Wholesale and retail trade; hotels and restaurants	-24.85%	0.83%	0.83%	0.83%	0.83%	-11.17%
15	71-75	Transport and storage; communication	6.50%	3.13%	3.13%	3.13%	3.13%	3.13%
16	81-88	Finance and insurance	-15.87%	-15.89%	-15.89%	-15.89%	-15.89%	-15.89%
17	93-96	Other services	-10.21%	-16.62%	-16.62%	-16.62%	-16.62%	-16.62%

Annexure D.

Figures

Figure 6: Formal Employment Graphs per Priority Industry



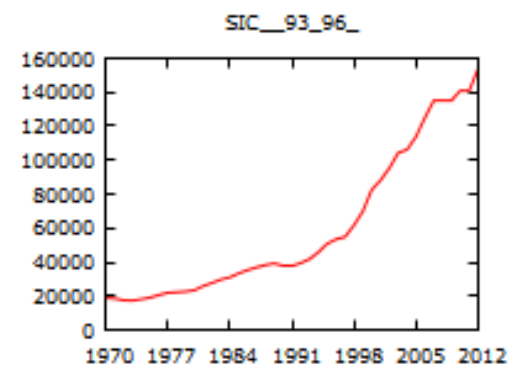
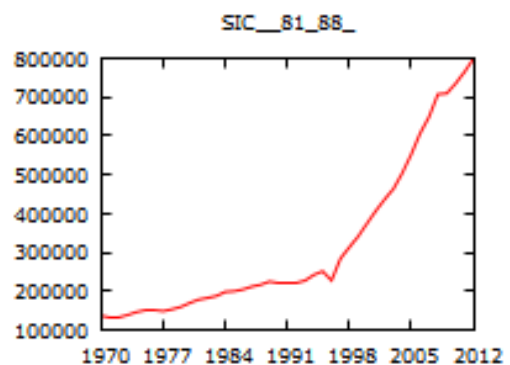
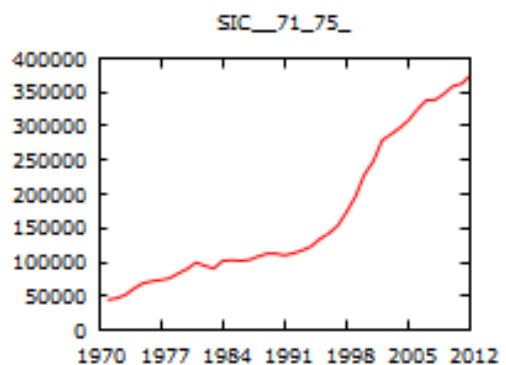
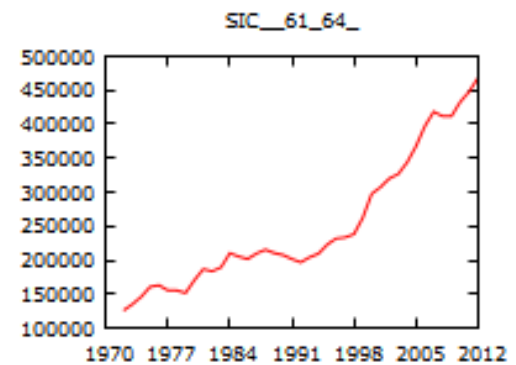
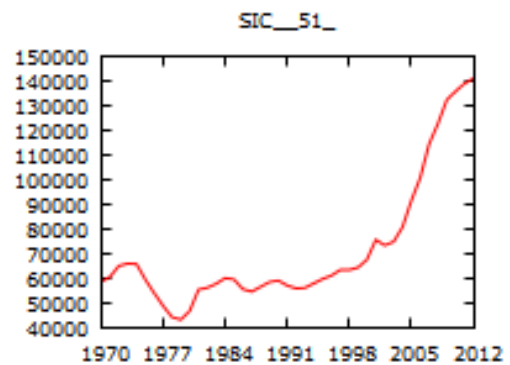
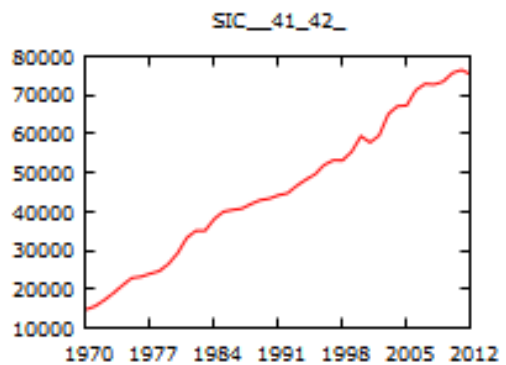
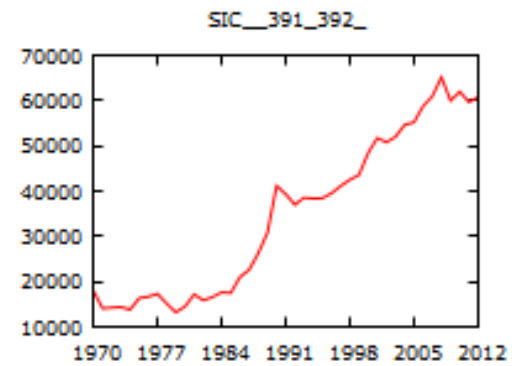
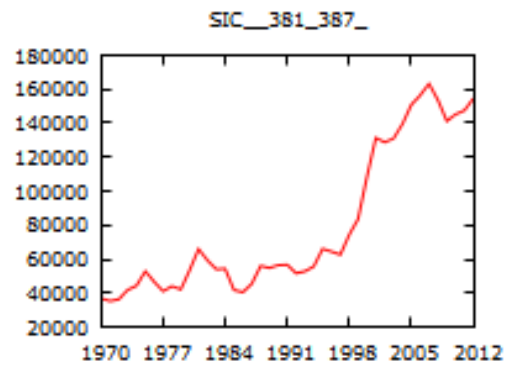
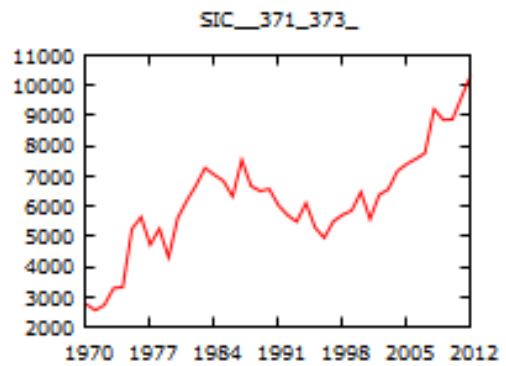
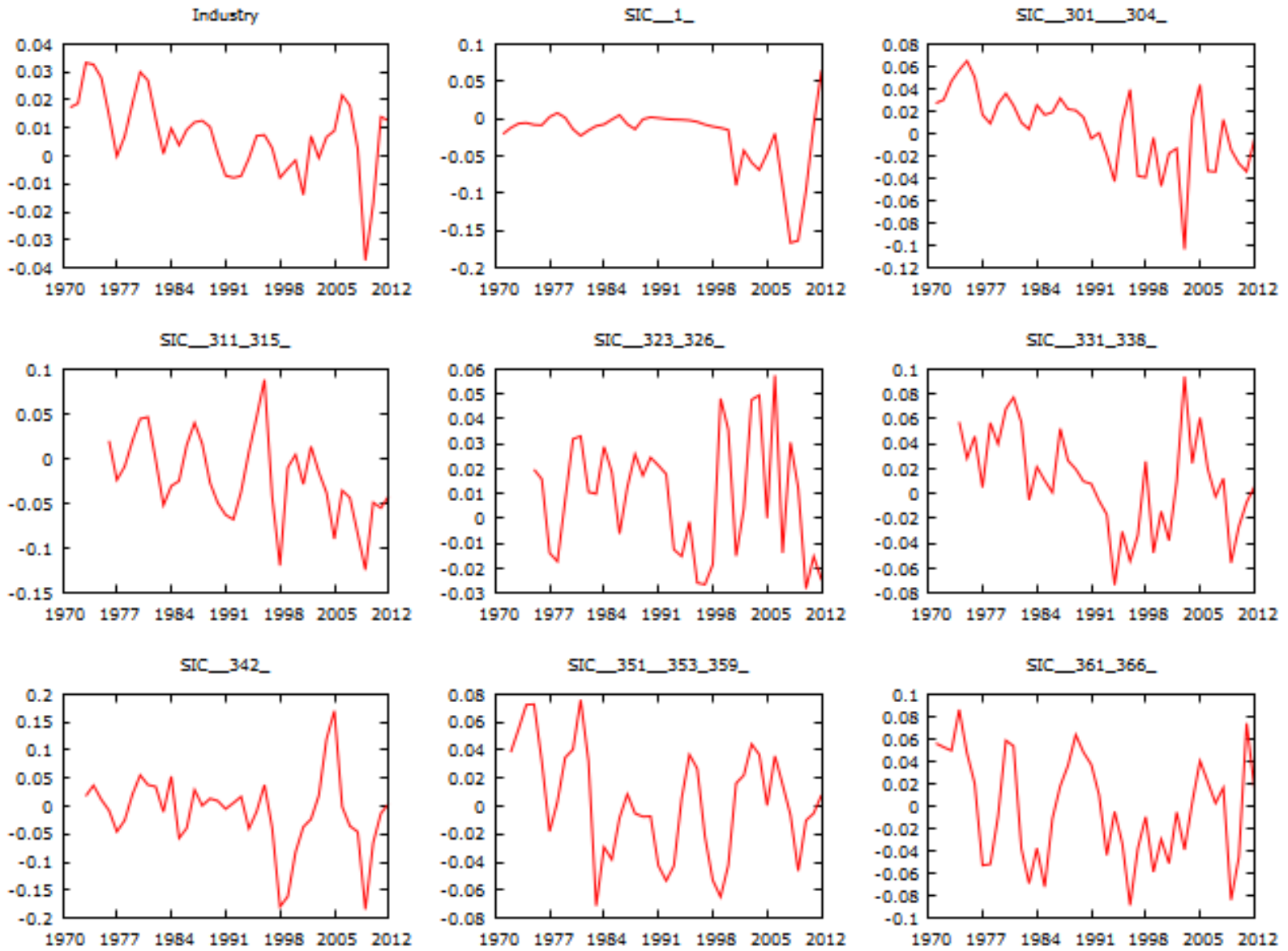


Figure 7: Formal Employment Growth Rate Graphs per Priority Industry



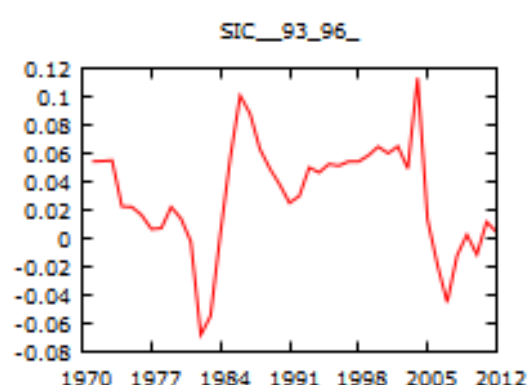
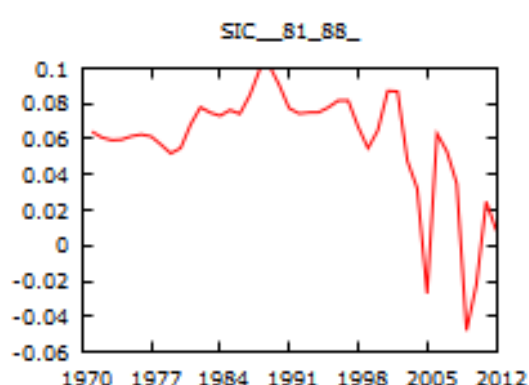
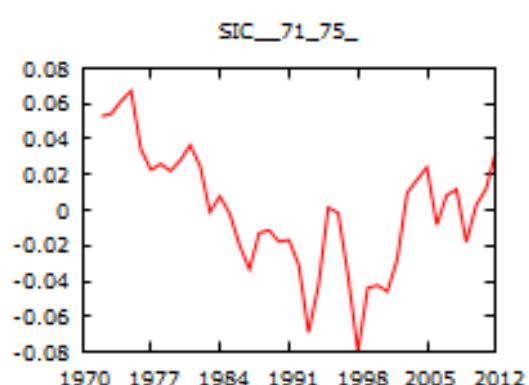
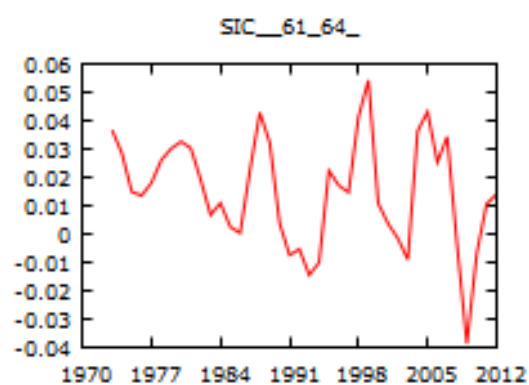
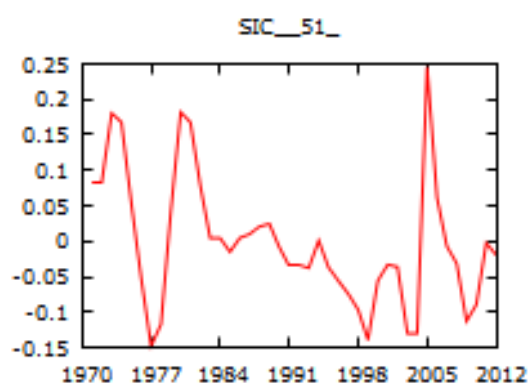
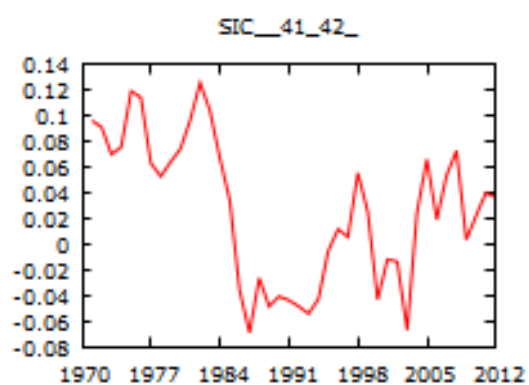
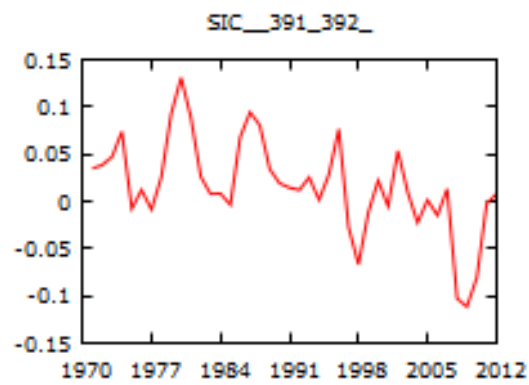
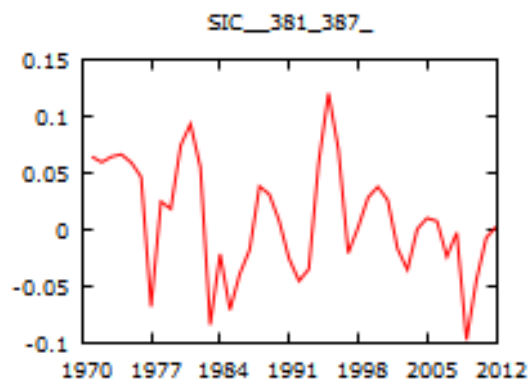
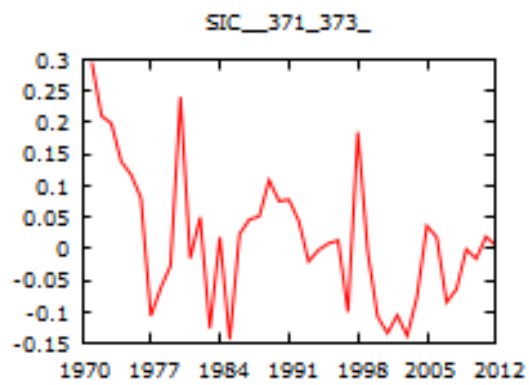


Figure 8: Formal Employment Scenario 2: Efficient Frontier

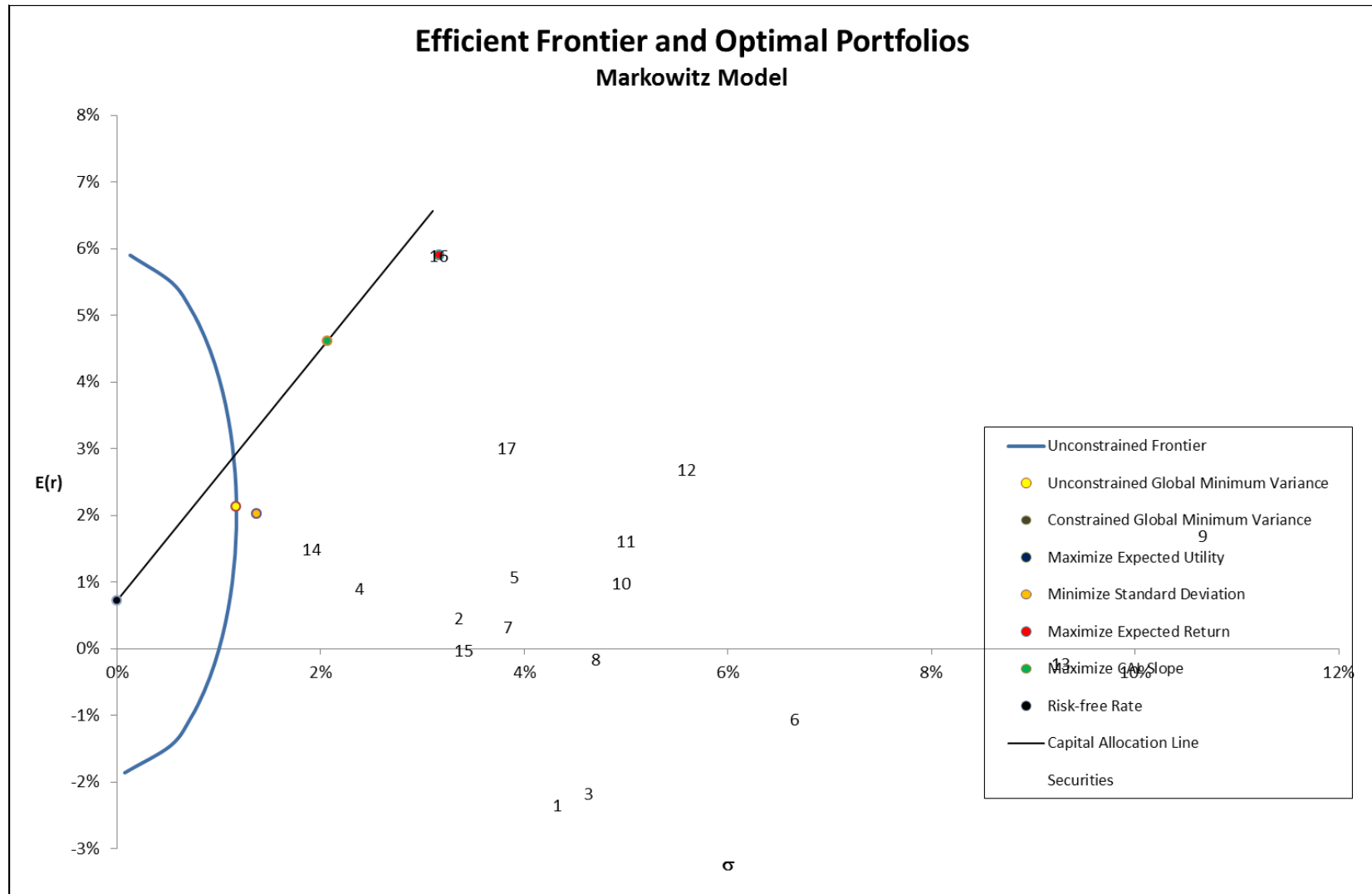


Figure 9: Formal Employment Scenario 3: Efficient Frontier

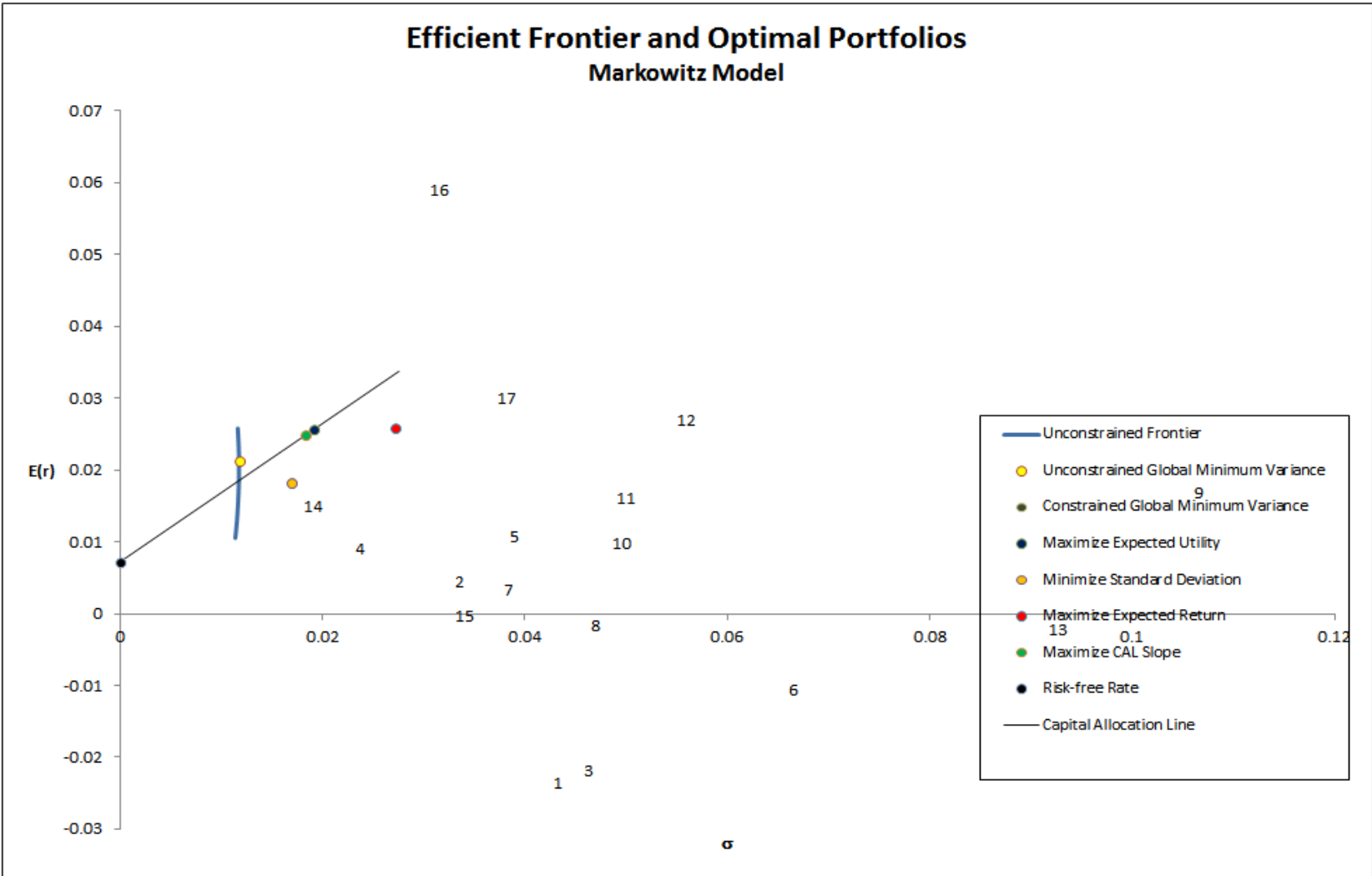
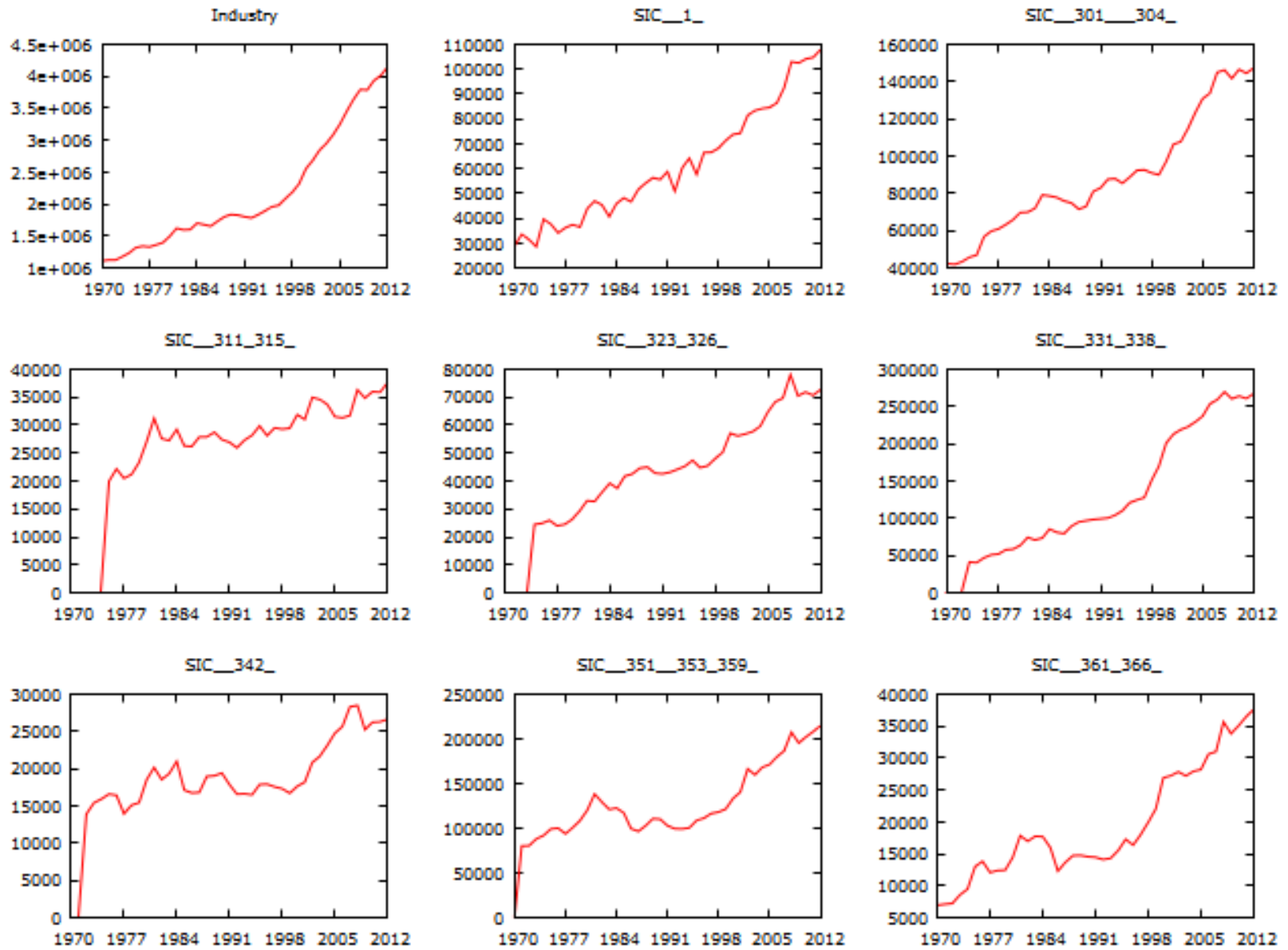


Figure 10: Real Output Graphs per Priority Industry



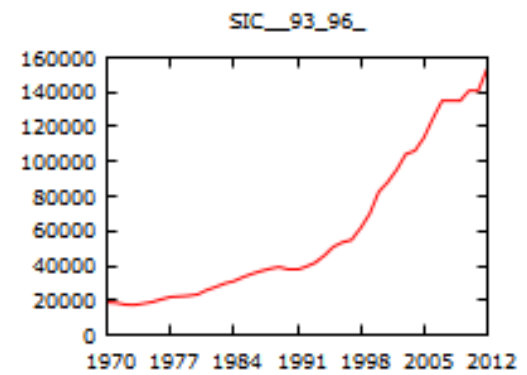
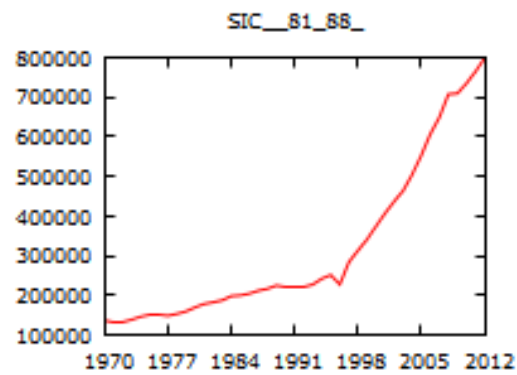
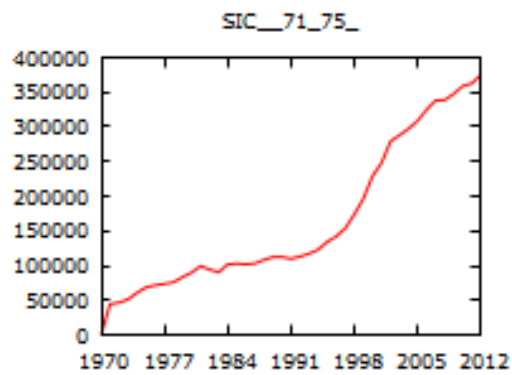
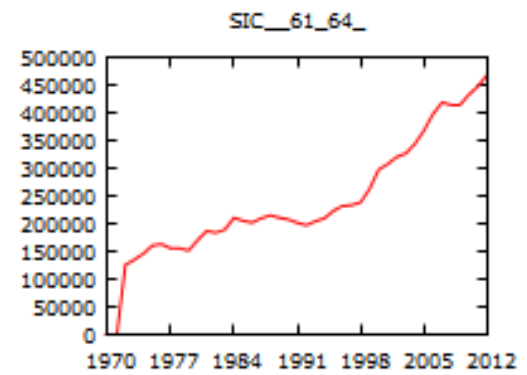
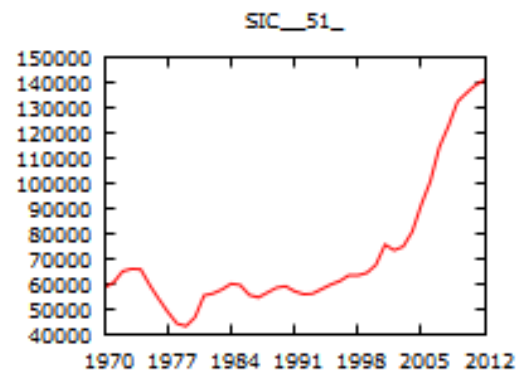
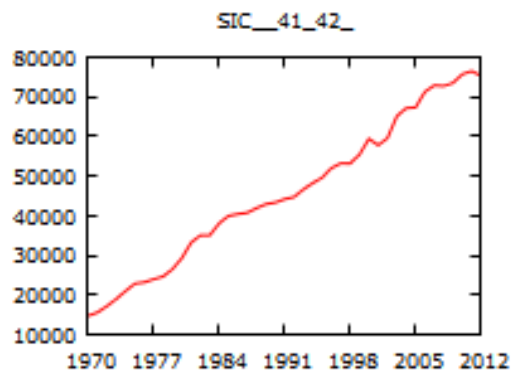
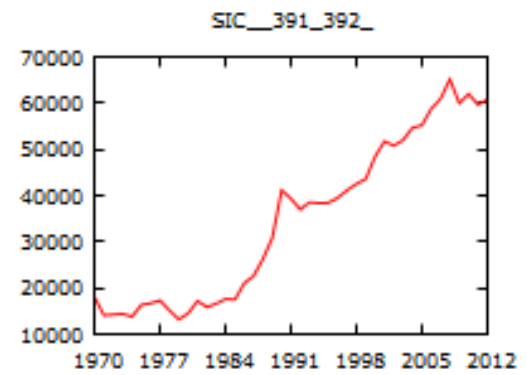
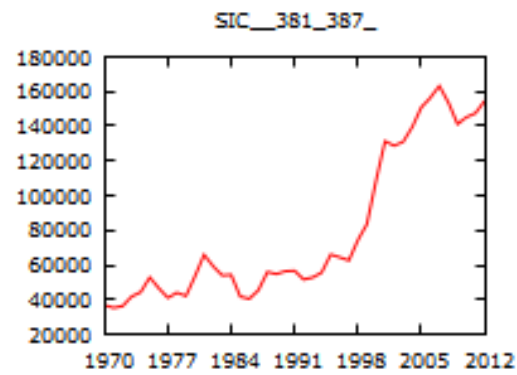
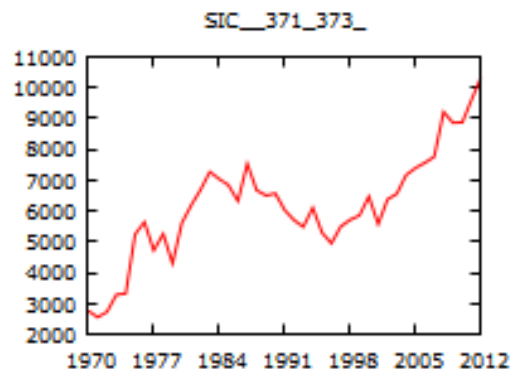
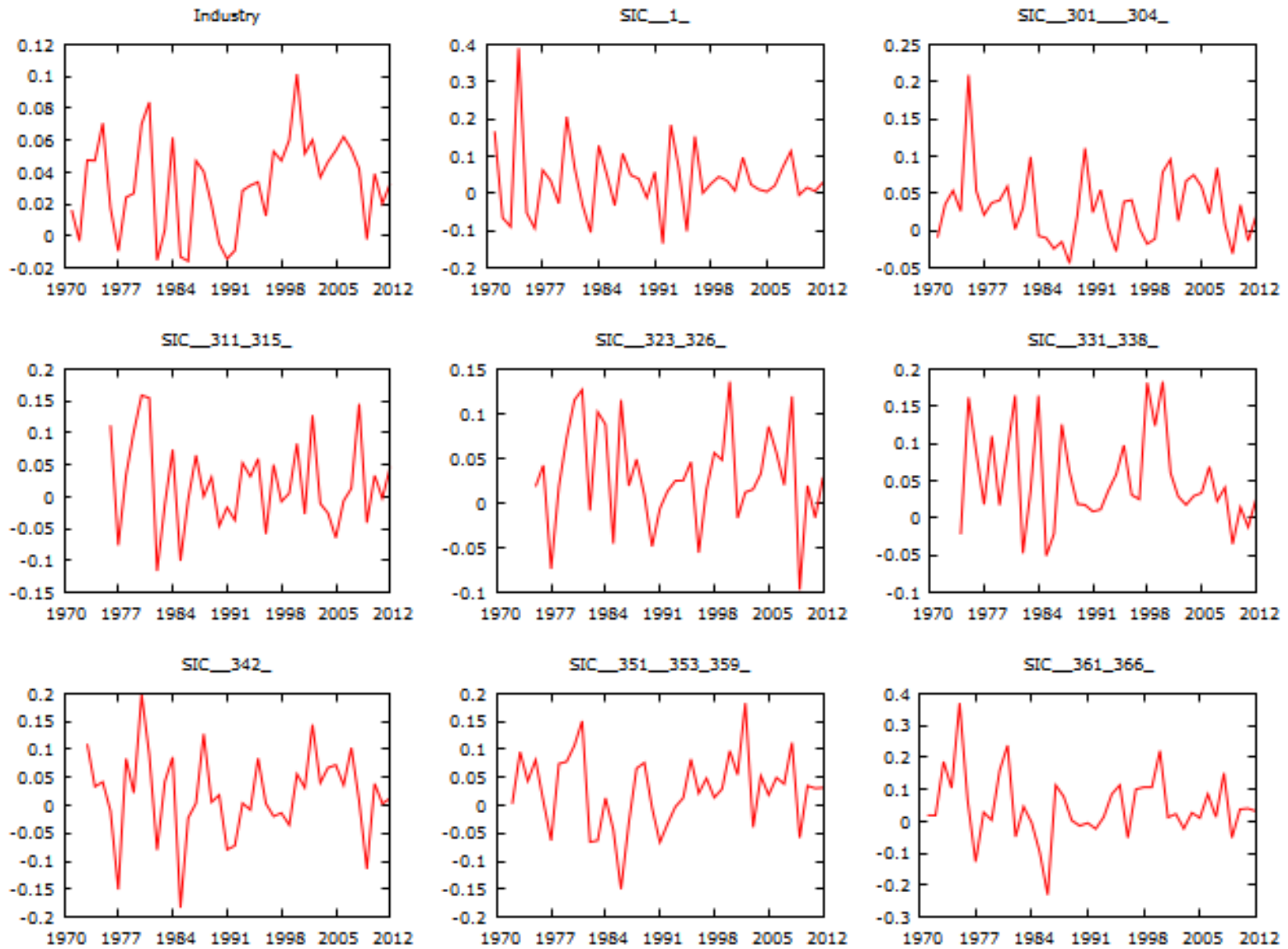


Figure 11: Real Output Growth Rate Graphs per Priority Industry



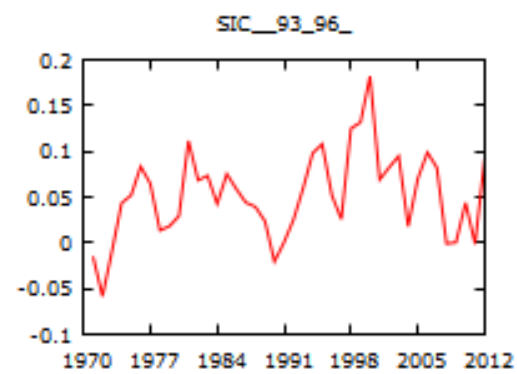
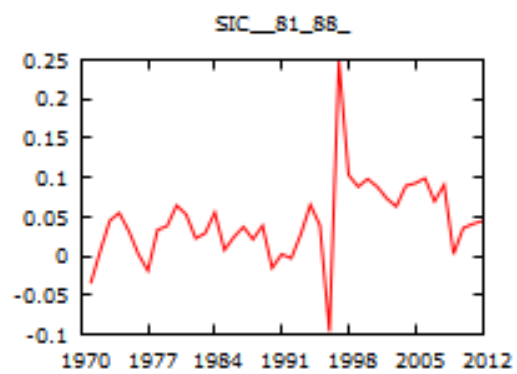
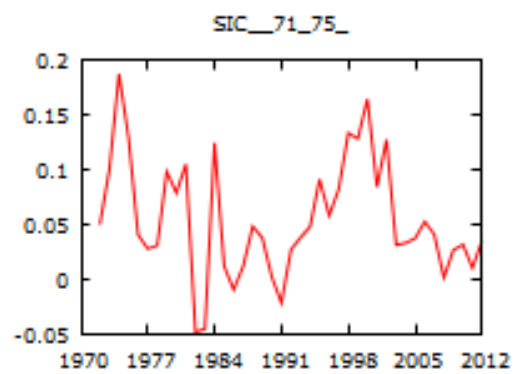
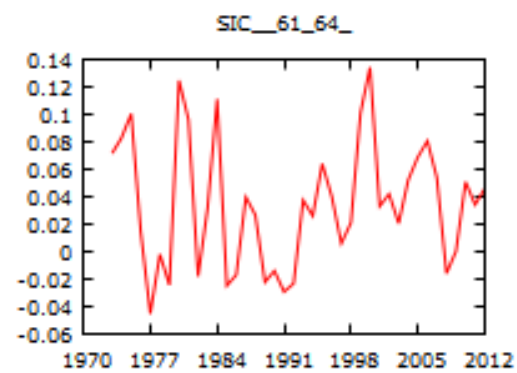
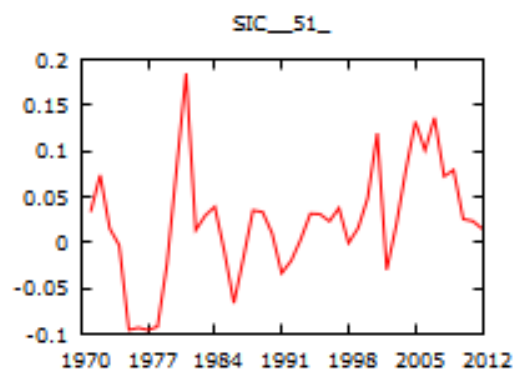
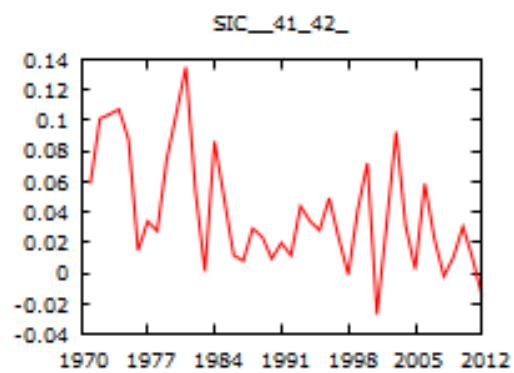
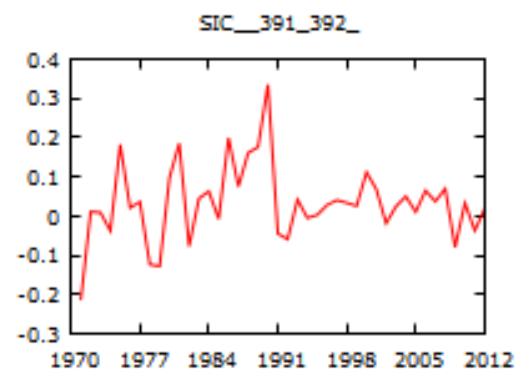
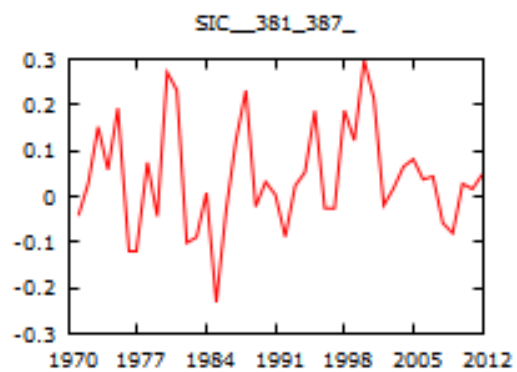
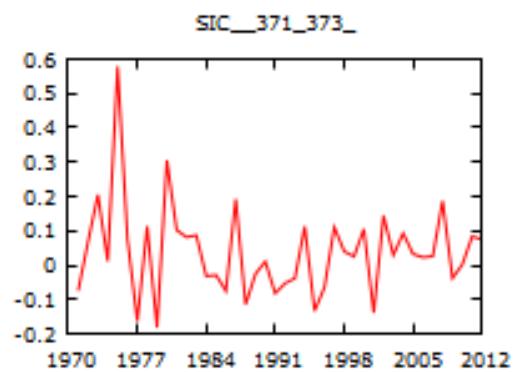


Figure 12: Real Output Scenario 2: Efficient Frontier

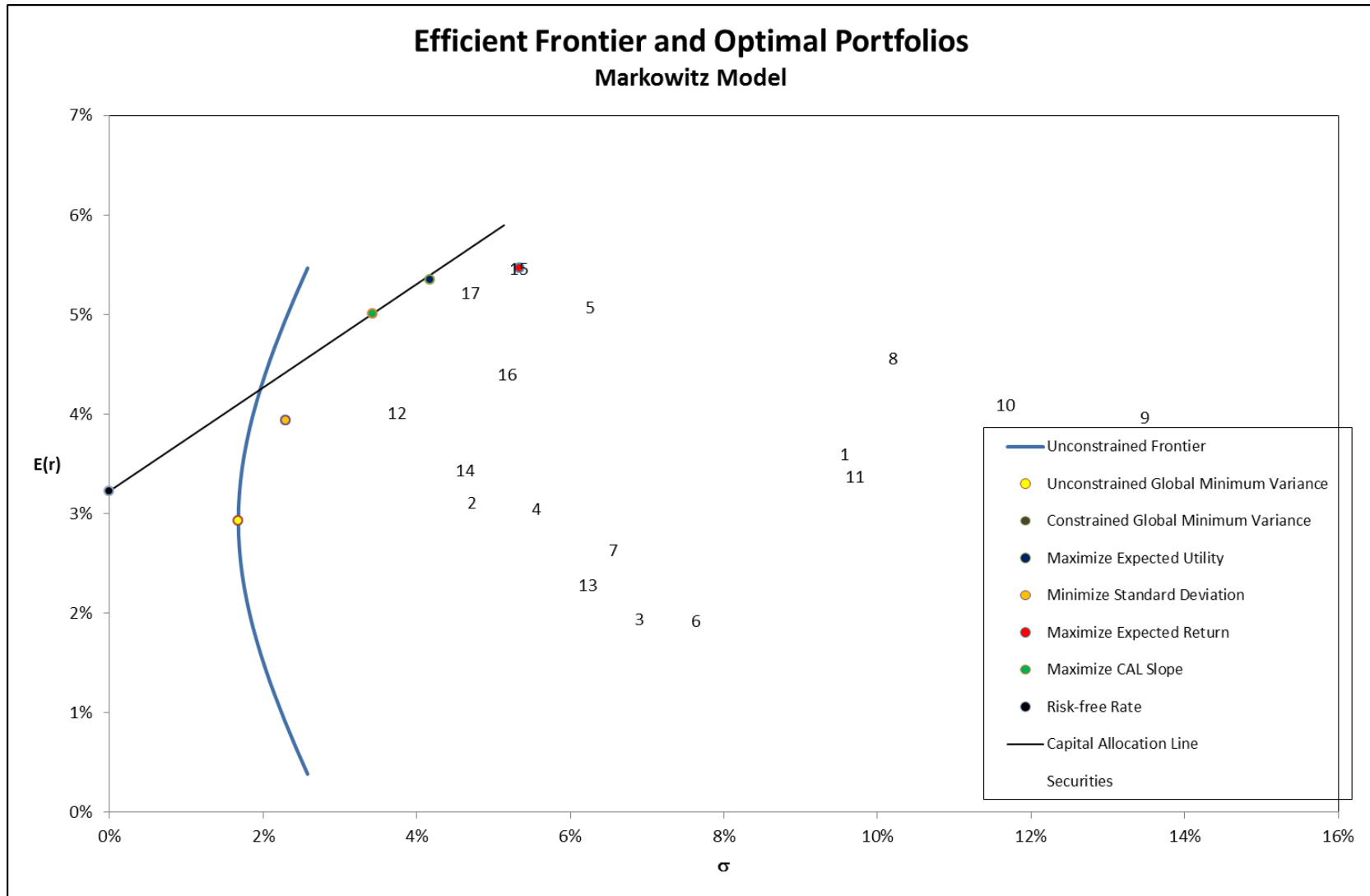


Figure 13: Real Output Scenario 3: Efficient Frontier

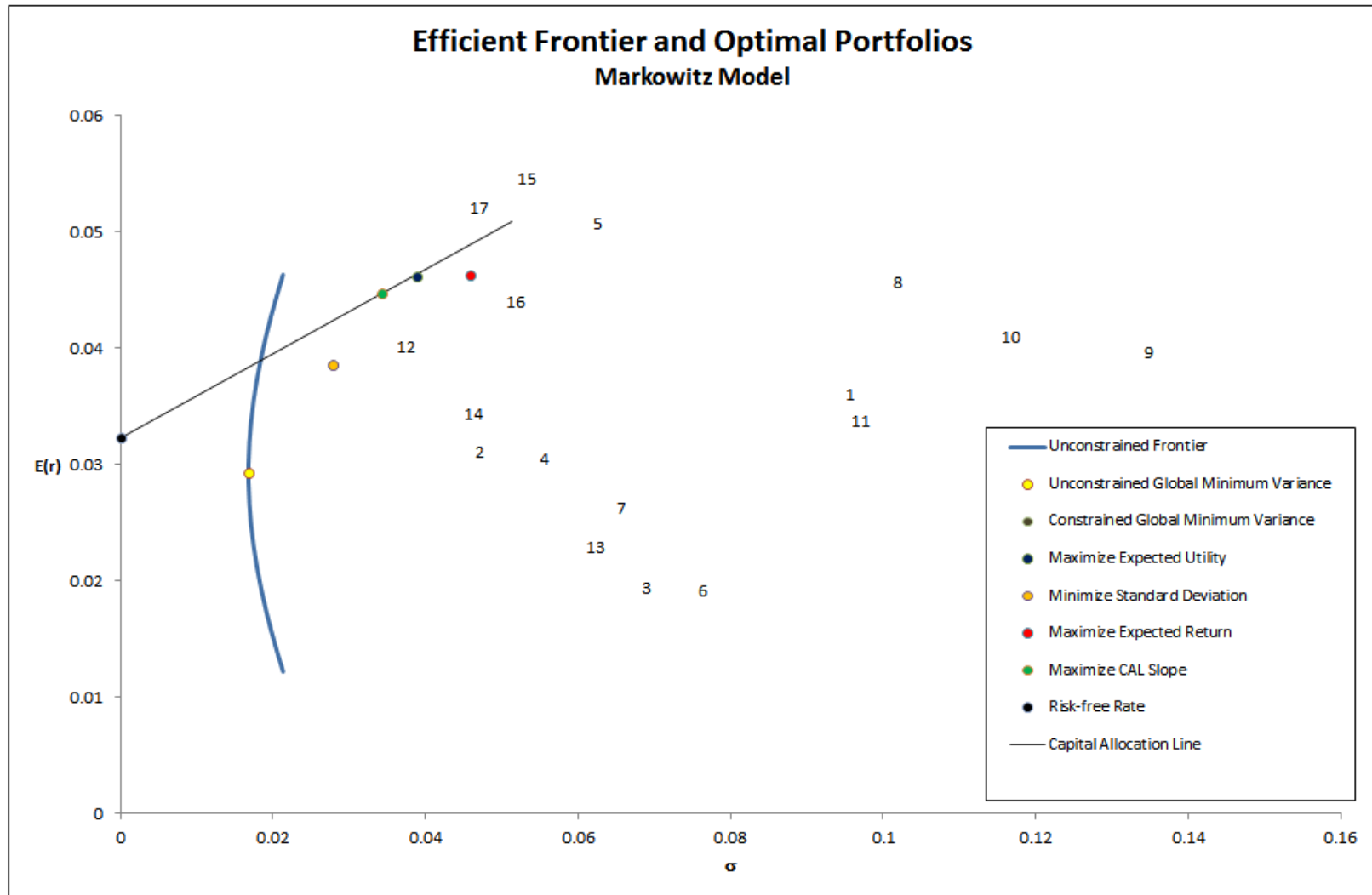
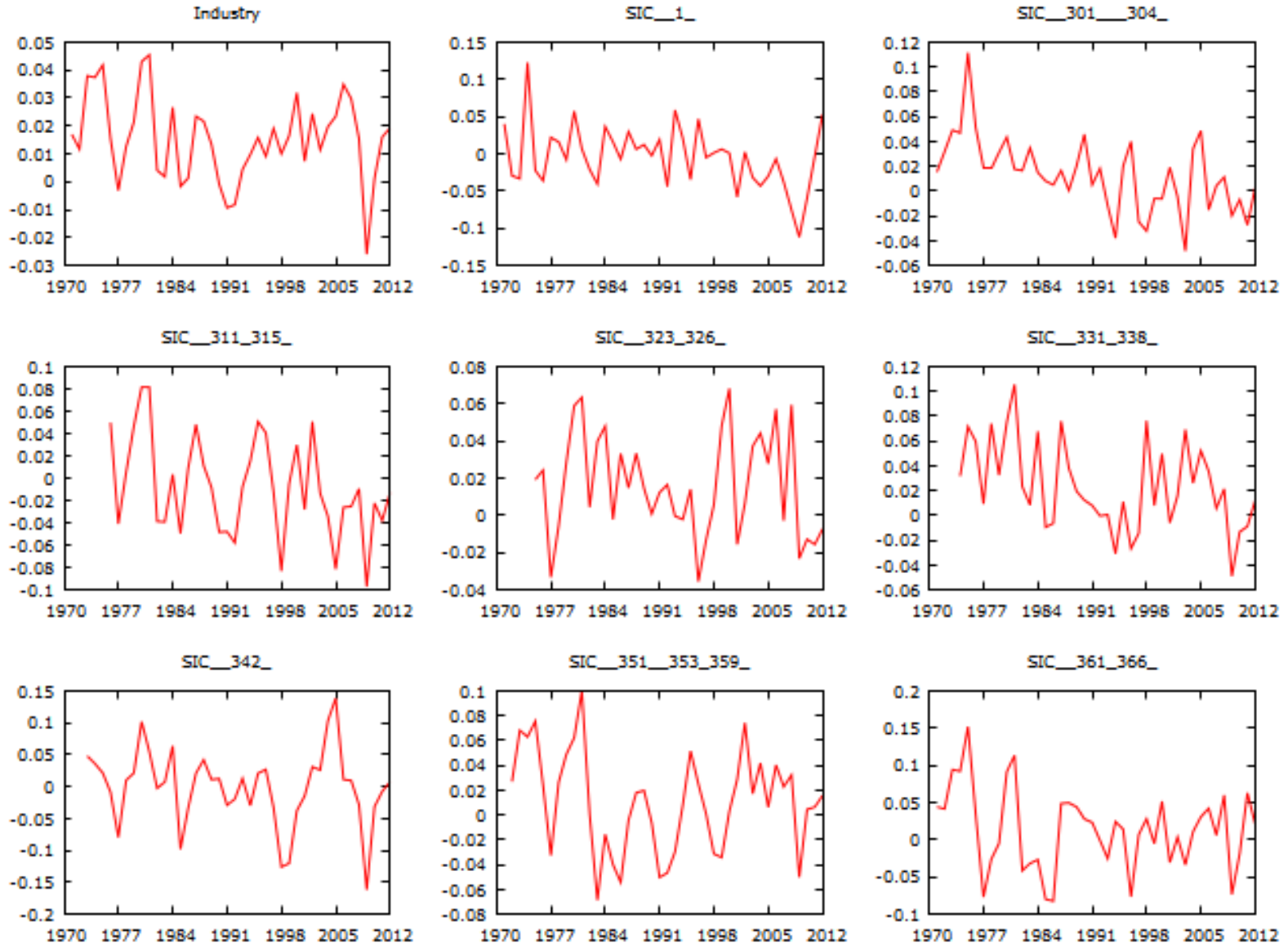


Figure 14: Optimised Portfolio Growth Rate Graphs per Priority Industry



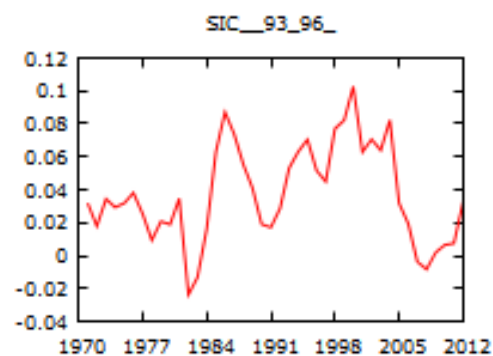
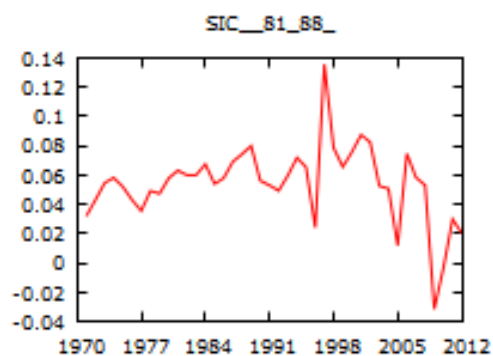
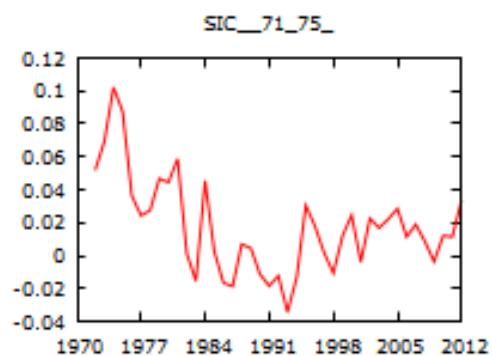
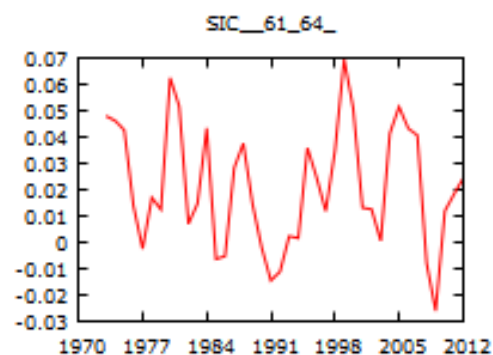
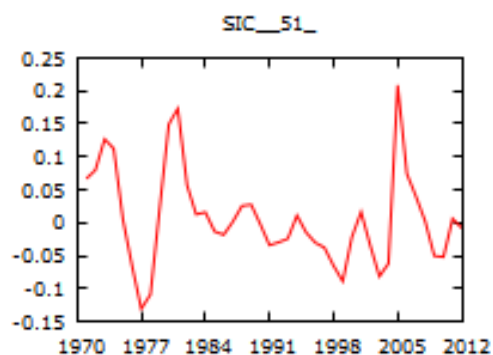
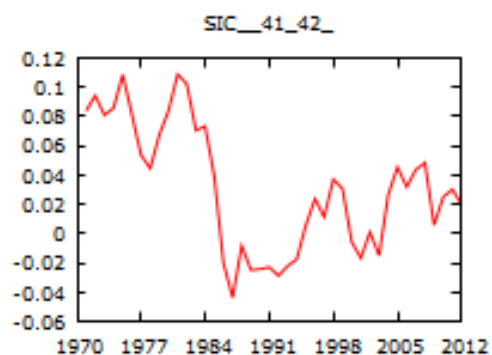
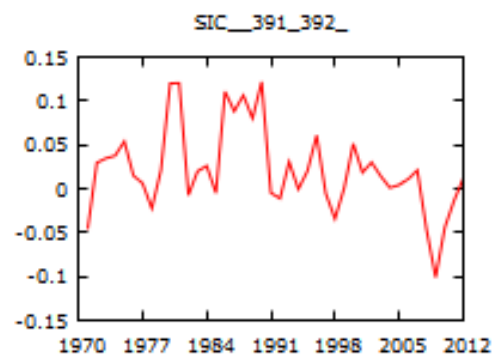
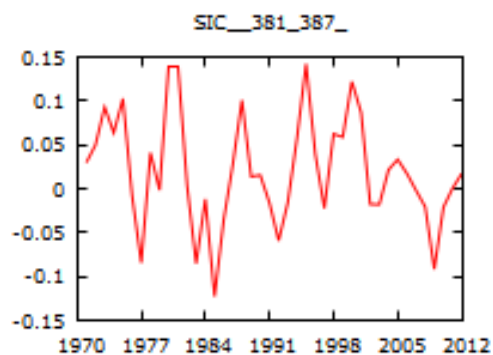
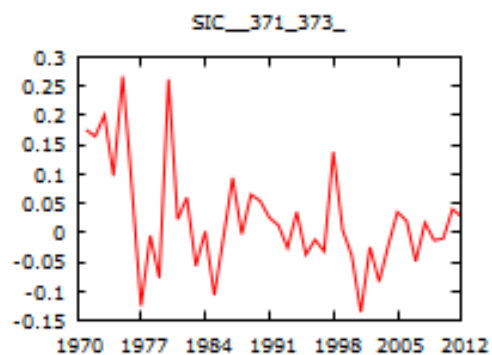


Figure 15: Optimised Portfolio Scenario 2: Efficient Frontier

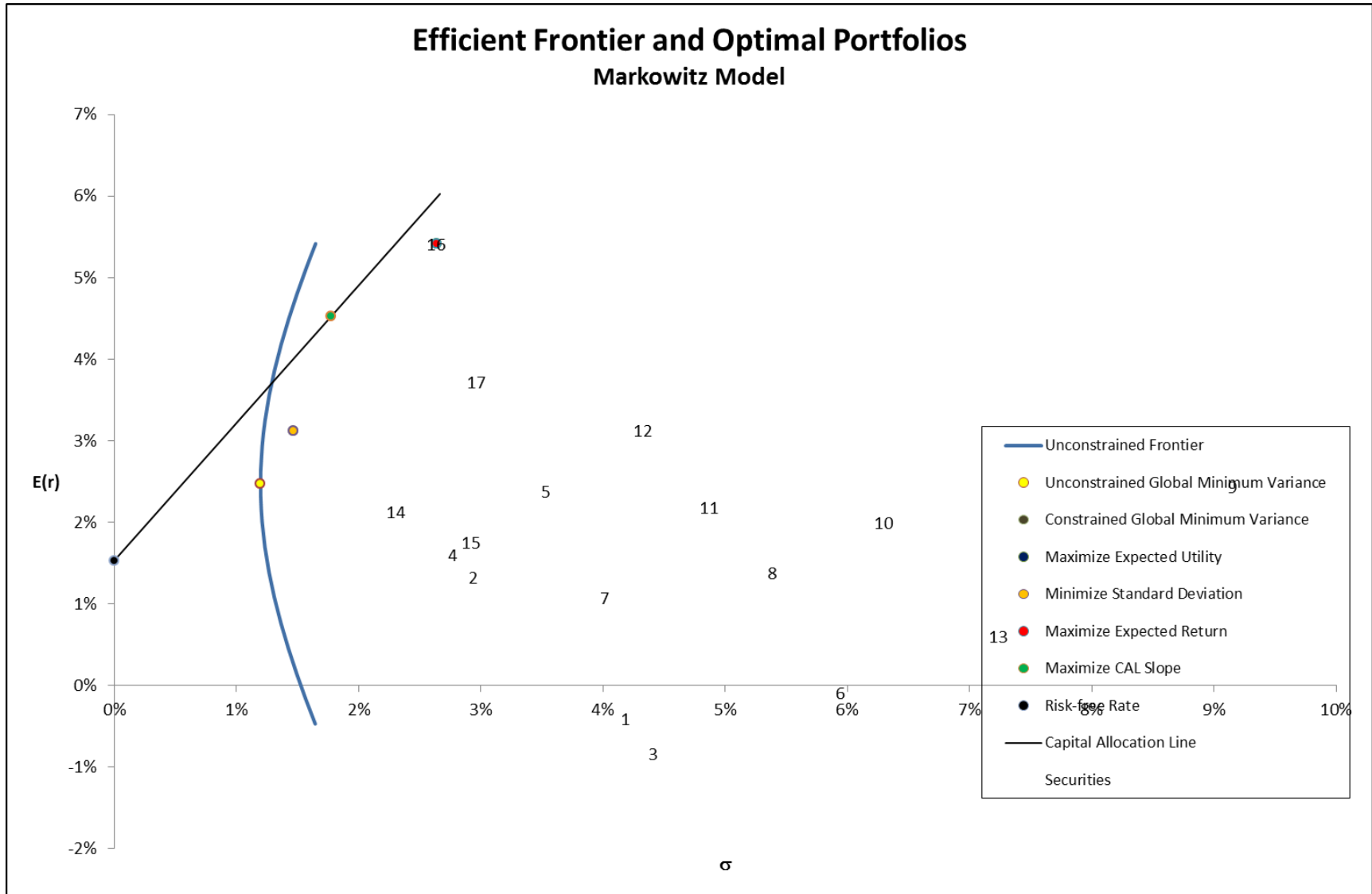
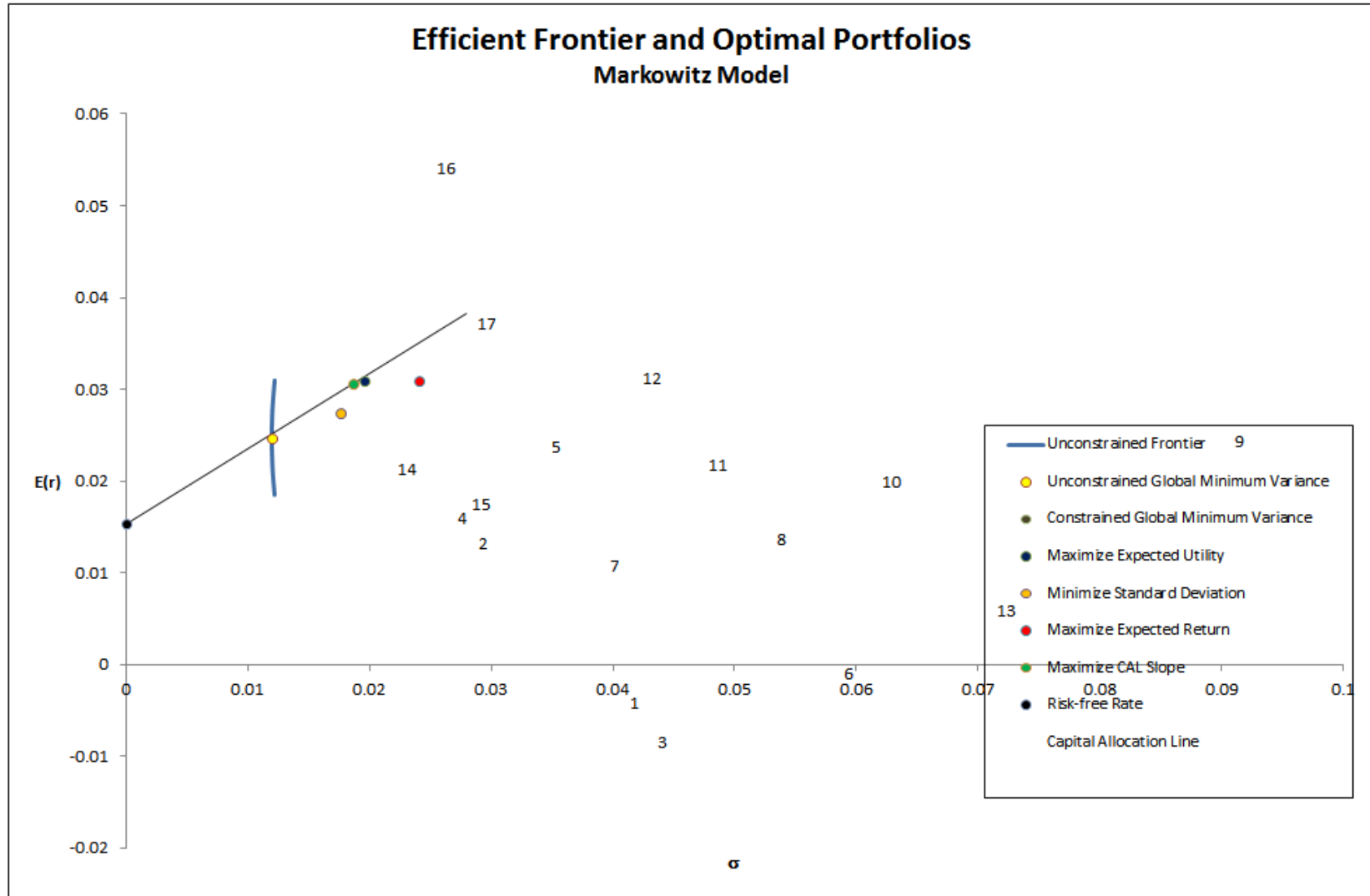


Figure 16: Optimised Portfolio Scenario 3: Efficient Frontier



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