



An Investigation into the Demand of Items in the Distinctive Environmental Uniform Clothing System

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Directorate of Materiel Group Operational Research

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Abstract

In 2005, the Canadian Forces (CF) changed the way Regular Force members acquire *Distinctive Environmental Uniform* (DEU) items: a monthly monetary allowance, known as the *Clothing Up-keep Allowance* (CUA), was replaced with a clothing replacement system based on the individual accrual of points. The costs of the DEU clothing system have increased in the years since its change from the CUA-based system to the points-based system. The Directorate of Materiel Group Operational Research (DMGOR) was tasked in September 2009 by the Deputy Chief of Staff Materiel (DCOS(Mat)) to examine if the reported difference in the costs of the DEU clothing system is due to increased demand by the DEU clients.

Per-capita turnover rates were calculated for several major groups of DEU items in the old system and the new system, and for each it was determined if these rates have changed with any statistical significance using Wilcoxon-Mann-Whitney tests. Statistically significant differences were found between the turnover rates in the time periods under the two different DEU systems for 7 of the 29 groups of items studied (and a further test was inconclusive). Hence, significant changes in the overall demand of DEU items on a per capita basis were not found to be widespread.

With respect to costs of the system, it was found that changes in the population of the DEU clients have been responsible for approximately 30% of the increases of costs of the DEU system, with the majority due to the increased number of initial issues clients – personnel newly entering service (either as new recruits, or upon changing services). Increases in the individual costs of the items were found to be consistent with the identified growth rate of 5.4% when the size and nature of the DEU client population was removed as a factor. No significant difference was found in the median price increases of those items which have had increased per-capita demand versus those which have not. It was concluded that there is little evidence that increased demand of the items on a per capita basis is responsible for the increases in the costs of the DEU system.

Résumé

En 2005, les Forces canadiennes (FC) ont changé la façon dont les membres de la Force régulière se procurent les articles de leur *uniforme distinctif d'élément* (UDE) : *l'indemnité d'entretien de l'habillement* (IEH), une somme qui était versée chaque mois, a cédé la place à un système de remplacement des vêtements fondé sur des points. Les coûts du système de vêtements UDE ont augmenté depuis que l'IEH a été remplacée par le système de points. En septembre 2009, le Sous-chef d'état-major - Matériel (SCEM Mat) a confié à la Direction - Recherche opérationnelle (Groupe des matériels) (DRO GM) la tâche d'examiner si les différences signalées dans les coûts du système UDE étaient attribuables à une demande accrue de la part des clients.

Des taux de rotation par tête ont été calculés pour plusieurs groupes principaux d'articles UDE sous le régime de l'ancien système et du nouveau système, et des tests de Wilcoxon-Mann-Whitney ont été réalisés pour voir si les taux de rotation avaient changé de manière statistiquement significative. Des différences statistiquement significatives ont été trouvées dans les taux de rotation observés au cours des périodes d'application de l'ancien système et du nouveau système pour sept des 29

groupes d'articles étudiés (les résultats d'un autre test ont été non concluants). Par conséquent, il n'y a pas eu de changements significatifs généralisés dans la demande globale d'articles UDE par tête.

En ce qui concerne les coûts du système, les résultats révèlent que les changements survenus dans la population de clients expliquent environ 30% de la hausse des coûts du système, la différence étant surtout attribuable à la hausse du nombre de clients qui ont reçu une distribution initiale de l'UDE, c'est-à-dire les nouveaux arrivants dans un service (les recrues ou les membres qui avaient changé de service). Les hausses des coûts individuels des articles correspondent au taux de croissance défini de 5,4% quand la taille et la nature de la population de clients du système UDE ne font plus partie des facteurs. Aucune différence significative n'a été trouvée dans les hausses des prix médianes entre les articles dont la demande par tête a augmenté et ceux dont la demande n'a pas augmenté. En conclusion, peu d'éléments permettent de croire que l'accroissement de la demande d'articles par tête est responsable de la hausse des coûts du système UDE.

Executive summary

An Investigation into the Demand of Items in the Distinctive Environmental Uniform Clothing System

Raman Pall; DRDC CORA TM 2012–047; Defence R&D Canada – CORA; March 2012.

Background: In 2005, the Canadian Forces (CF) changed the way in which Regular Force members acquire *Distinctive Environmental Uniform* (DEU) items: a monthly monetary allowance, known as the *Clothing Upkeep Allowance* (CUA), was replaced with a clothing replacement system based on the individual accrual of points. This change was necessitated by a shift in the usage of clothing by the CF, from daily usage of DEU by the majority of the Regular forces, to the widespread use of operational clothing, which is replaced on an exchange basis. As a result, it became necessary to modernize the system for replacing DEU items [1].

The points-based system was designed to allow the CF to meet its mandate to provide DEU items to its clients (the members of the CF). Moreover, it was expected that DND would save millions of dollars annually through the use of this system in lieu of the CUA. By September 2005, the change in the DEU clothing system (from the CUA-based system to the current point-based system) was complete for the Regular force, and by April 2006 the same was true of the Reserve force.

The overall costs of the DEU clothing system have increased in the years since its change from the CUA-based system to the points-based system [2]. Several explanations have been offered to account for this difference: personnel may have been retaining a portion of their monetary allowance in the old system, leading to an artificially reduced demand in the old system; some personnel may be given an incentive to replace their DEU items at a faster rate than is necessary due to the maximum possible accumulation of points in the new system; amongst other possible reasons.

Scope: The Directorate of Materiel Group Operational Research (DMGOR) was tasked in September 2009 by the Deputy Chief of Staff Materiel to examine if the reported difference in the costs of the DEU clothing system was due to increased demand by the DEU clients. The approach undertaken by DMGOR was to calculate the per-capita turnover rates for several major groups of DEU items in the old system and the new system, and to determine if these rates have changed with any statistical significance.

A total of 22 groups of items were studied, each of which corresponds to several major sets of items (e.g., sweaters, raincoats, or shirts) used by at least one of the three services (Air Force, Army, and Navy). The 22 groups were consolidated into seven larger groups (called aggregate groups), in order to study the changes in turnover rates for similar items across the entire CF instead of within one specific service.

Non-parametric statistical tests (specifically, Wilcoxon-Mann-Whitney tests) were performed on the per-capita turnover rates for each group of DEU items to determine if the median turnover rates have changed in the new system versus the old system with any statistical significance.

The annual costs of the DEU system were studied to determine if increased demand of the DEU items was responsible for increased costs of the system. Furthermore, the compound annual growth rate (CAGR) of the costs of the system – a measure of the smoothed annualized increase in the cost of these costs – was computed. The relative contributions of several factors resulting in the increases in the overall costs were identified.

Principal Results: It was found that there were no significant differences in the turnover rates of any of the aggregate groups, although there were a few statistically significant differences for individual environment-specific item groups, and the statistical test was inconclusive for one item group. More specifically, a total of seven statistically significant differences were found among the 29 item groups and aggregate groups studied. At the significance level used in the statistical tests there is a low chance (less than 5%) of finding a difference where none exists. Furthermore, the fraction of the total costs of the DEU system occupied by these items (for which significant differences were found) was determined. This fraction was 31% during the CUA-based period of the DEU system, and 28% during the points-based period of the DEU system.

With respect to costs of the system, it was found that changes in the population of the DEU clients have been responsible for approximately 30% of the increases of costs of the DEU system, with the majority due to the increased number of initial issues clients – personnel newly entering service either as new recruits, or upon changing services. More specifically, increases in the number of initial issues were responsible for an average annual increase in costs of 2.0%, or a 25.9% relative contribution to the CAGR; and increases in the number of non-initial issues clients were responsible for an average annual increase in costs of 0.3%, or a 4.1% relative contribution to the CAGR. The remainder of the increases in costs of the system (an average annual increase in costs of 5.4%, which is a relative contribution of 70%) are due to either increased demand of the items, or increases in costs of the items themselves. These results are presented in Table 1.

Table 1: *The absolute and relative contributions to the increases in the costs of the DEU system.*

Cause	Contribution to the CAGR	
	Absolute	Relative
Increases in Initial Issues	2.0%	25.9%
Increases in non-Initial Issues Clients	0.3%	4.1%
Other (Increases in Demand or Item cost)	5.4%	70.0%
<i>Total</i>	<i>7.8%</i>	<i>100.0%</i>

The mean annual increase in costs of the individual items was found to be 6.4%, with a median increase of 3.4%. Moreover, using a non-parametric statistical test, no significant difference was found in the median price increases of those items which have had increased per-capita demand versus those which have not.

Conclusions and Future Work: As only seven of the 29 statistical tests found a statistically significant difference between the turnover rates in the periods under the two different DEU systems

(and a further test was inconclusive), and the items for which a difference was found accounted for between 28% and 31% of the total costs of the DEU system, significant changes in the overall demand of DEU items on a per capita basis were not found to be widespread.

Moreover, increases in the individual costs of the items were found to be consistent with the identified growth rate of 5.4% when the size and nature of the DEU client population was removed as a factor. This fact, combined with the result that no significant difference was found in the median price increases of those items which have had increased per-capita demand versus those which have not, results in the conclusion that there is little evidence that increased demand of the items is responsible for the increased cost of the system.

It was concluded that increases in the costs of the individual items is largely responsible for the increases in the costs of the DEU system, with the remainder (approximately 30%) caused by changes in the population of the DEU clients (primarily increases in the number of initial issues clients).

Sommaire

An Investigation into the Demand of Items in the Distinctive Environmental Uniform Clothing System

Raman Pall ; DRDC CORA TM 2012-047 ; R & D pour la défense Canada – CARO ; mars 2012.

Contexte : En 2005, les Forces canadiennes (FC) ont changé la façon dont les membres de la Force régulière se procurent les articles de leur *uniforme distinctif d'élément* (UDE) : l'*indemnité d'entretien de l'habillement* (IEH), une somme qui était versée chaque mois, a cédé la place à un système de remplacement des vêtements fondé sur des points. Ce changement avait été rendu nécessaire en raison de la réorientation de l'utilisation des vêtements, du port quotidien de l'UDE par la majorité des membres de la Force régulière au port généralisé de vêtements opérationnels, qui sont remplacés par échange. Il était donc nécessaire de moderniser le système de remplacement des articles UDE [1].

Le système de points a été conçu de sorte que les FC puissent s'acquitter de leur mandat qui consiste à offrir des articles UDE à leurs clients (les membres des FC). De plus, le MDN prévoyait économiser des millions de dollars chaque année en ayant recours à ce système plutôt qu'à l'IEH. Depuis septembre 2005, les membres de la Force régulière ont accès au nouveau système pour se procurer les articles de leur UDE (l'IEH a été remplacée par le système de points en place actuellement) ; les membres de la Force de réserve ont quand à eux eu accès au nouveau système en avril 2006.

Les coûts globaux du système UDE ont augmenté depuis que l'IEH a été remplacée par le système de points [2]. Plusieurs raisons ont été avancées pour expliquer la différence : entre autres, les membres gardaient peut-être une partie de l'indemnité mensuelle accordée dans l'ancien système, ce qui a pu réduire artificiellement la demande, et certains membres sont peut-être incités à remplacer les articles de leur UDE plus rapidement qu'il ne serait nécessaire en raison de l'accumulation de points limitée dans le nouveau système.

Portée : En septembre 2009, le Sous-chef d'état-major - Matériel (SCEM Mat) a confié à la Direction - Recherche opérationnelle (Groupe des matériels) (DRO GM) la tâche d'examiner si les différences signalées dans les coûts du système UDE étaient attribuables à une demande accrue de la part des clients. L'approche adoptée par la DRO GM consistait à calculer des taux de rotation par tête pour plusieurs groupes principaux d'articles UDE sous le régime de l'ancien système et du nouveau système, et à déterminer si les taux avaient changé de manière statistiquement significative.

En tout, 22 groupes d'articles ont été étudiés, chaque groupe étant constitué de plusieurs importants ensembles d'articles (p. ex. chandails, imperméables ou chemises) utilisés par au moins un des trois services (Force aérienne, Armée de terre, Marine). Les 22 groupes ont été combinés en sept groupes plus gros (appelés "regroupements") pour permettre l'étude de la variation des taux de rotation d'articles semblables dans l'ensemble des FC plutôt qu'au sein d'un service particulier.

Des tests statistiques non paramétriques (à savoir des tests de Wilcoxon-Mann-Whitney) ont été réalisés sur les taux de rotation par tête pour chaque groupe d'articles UDE en vue de déterminer si

les taux de rotation médians avaient changé de manière statistiquement significative dans le nouveau système par rapport à ce qu'ils étaient dans l'ancien système.

Les coûts annuels du système UDE ont été étudiés pour voir si l'augmentation des coûts est attribuable à l'accroissement de la demande d'articles. De plus, le taux de croissance annuel composé (TCAC) des coûts du système, une mesure de la hausse annualisée lissée de ces coûts, a été calculé. La contribution relative de plusieurs facteurs expliquant la hausse des coûts globaux a été définie.

Principaux résultats : Aucune différence significative n'a été trouvée dans les taux de rotation des regroupements, même si quelques différences statistiquement significatives ont été cernées dans le cas de certains groupes d'articles particuliers propres à une armée, et le test statistique a été non concluant pour un groupe d'articles. Plus précisément, sept différences statistiquement significatives ont été trouvées parmi les 29 groupes d'articles et les regroupements étudiés. Au niveau de signification utilisé dans les tests statistiques, les chances sont minces (inférieures à 5%) de trouver une différence quand en fait il n'y a pas de différence. De plus, la fraction des coûts totaux du système UDE que représentent ces articles (pour lesquels des différences significatives ont été trouvées) a aussi été calculée. La fraction est égale à 31% pour la période pendant laquelle le système était fondé sur l'IEH, et à 28% pour la période pendant laquelle le système était fondé sur des points.

Quant aux coûts du système, l'étude a révélé que les changements survenus dans la population de clients expliquent environ 30% de la hausse des coûts du système UDE, la différence étant surtout attribuable à la hausse du nombre de clients qui ont reçu une distribution initiale de l'UDE, c'est-à-dire les nouveaux arrivants dans le service (les recrues ou les membres qui avaient changé de service). Plus particulièrement, la hausse du nombre de clients qui ont reçu une distribution initiale de l'UDE explique une augmentation annuelle moyenne des coûts de 2,0%, ce qui représente une contribution relative de 25,9% au TCAC, tandis que la hausse du nombre de clients qui ont reçu une distribution subséquente d'articles explique une augmentation annuelle moyenne des coûts de 0,3%, c'est-à-dire une contribution relative de 4,1% au TCAC. Le reste de la hausse des coûts du système (une augmentation annuelle moyenne des coûts de 5,4%, ce qui représente une contribution relative de 70%) s'explique soit par la demande accrue d'articles, soit par l'augmentation des coûts des articles comme tels. Les résultats sont présentés au tableau 2.

Tableau 2 : Contributions absolues et relatives à la hausse des coûts du système UDE.

Cause	Contribution au TCAC	
	Absolue	Relative
Hausse du nombre de clients ayant reçu une distribution initiale de l'UDE	2,0%	25,9%
Hausse du nombre de clients ayant reçu une distribution subséquente d'articles	0,3%	4,1%
Autre (demande accrue ou augmentation des coûts des articles)	5,4%	70,0%
<i>Total</i>	<i>7,8%</i>	<i>100,0%</i>

L'augmentation annuelle moyenne des coûts des articles s'élève à 6,4%, la hausse médiane étant de 3,4%. En outre, la réalisation d'un test non paramétrique n'a pas permis de déceler de différence significative dans les hausses des prix médianes entre les articles dont la demande par tête a augmenté et ceux dont la demande n'a pas augmenté.

Conclusions et travaux futurs : Étant donné que seulement sept des 29 tests statistiques ont révélé des différences statistiquement significatives dans les taux de rotation au cours des périodes d'application de l'ancien système et du nouveau système (les résultats d'un autre test ont été non concluants) et que les articles pour lesquels une différence a été trouvée représentent de 28% à 31% des coûts totaux du système UDE, il n'y a pas eu de changements significatifs généralisés dans la demande globale d'articles UDE par tête.

De plus, les hausses des coûts individuels des articles correspondent au taux de croissance défini de 5,4% quand la taille et la nature de la population de clients du système UDE ne font plus partie des facteurs. Ce fait, combiné à l'absence de différence significative dans les hausses des prix médianes entre les articles dont la demande par tête a augmenté et ceux dont la demande n'a pas augmenté, mène à la conclusion suivante : peu d'éléments permettent de croire que l'accroissement de la demande d'articles par tête est responsable de la hausse des coûts du système UDE.

Ce sont les hausses des coûts des articles individuels qui expliquent en grande partie la hausse des coûts du système UDE, le reste (environ 30%) de la hausse étant attribuable aux changements survenus dans la population de clients du système UDE (essentiellement une hausse du nombre de clients ayant reçu une distribution initiale de l'UDE).

Table of contents

Abstract	i
Résumé	i
Executive summary	iii
Sommaire	vi
Table of contents	ix
List of tables	xi
List of figures	xiii
1 Introduction	1
1.1 Background and Context	1
1.2 The Tasking	1
1.3 Structure of the Report	2
2 The Methodology	3
2.1 Datasets	3
2.1.1 Clothing Online	3
2.1.2 The Clothing Stores and the Clothing Online Datasets	3
2.1.3 Summary of the Data on DEU Orders	4
2.1.4 Initial Issues Clients	4
2.1.5 Demographics Data	5
2.2 Turnover Rate Calculations	5
2.2.1 Mathematical Presentation of the Turnover Calculations	8
2.2.2 An Example of the Turnover Calculations	9
2.2.3 Statistical Tests	11
2.2.4 Key Assumptions and Limitations	11
2.3 Costs of the DEU System	13

2.3.1	Costs due to the Initial Issues Clients and the non-Initial Issues Clients . . .	13
2.3.2	Mathematical Presentation of the Costs Calculations	13
2.3.3	Increases in Costs of the Items	15
3	Results on Turnover Rates	16
3.1	Results of the Statistical Tests	21
3.2	A Comparison to Parametric Techniques	21
4	Results on Cost Increases	23
4.1	Compound Annual Growth Rates	23
4.2	Increases in Item Costs	25
4.3	Summary of the Results on Costs	27
5	Conclusions and Recommendations	28
	References	29
	Annex A: Items Provided as Initial Issues	31
	Annex B: The Demographics Dataset	43
	Annex C: The Item Groups	45
	List of Acronyms & Abbreviations	50

List of tables

Table 1:	The absolute and relative contributions to the increases in the costs of the DEU system.	iv
Tableau 2 :	Contributions absolues et relatives à la hausse des coûts du système UDE. . . .	vii
Table 3:	Annual (calendar year) costs of the DEU Clothing System, in nominal CAD. . .	2
Table 4:	A summary of the demographics dataset.	5
Table 5:	Items in the trousers, slacks, and skirts group for personnel in the Navy. . . .	6
Table 6:	The groups of items studied.	7
Table 7:	The quantities of items in Group 6 (Trousers, Slacks, and Skirts (Navy)) ordered through the Clothing Stores, or via Clothing Online.	10
Table 8:	The number of DEU clients, the number of initial issue clients, and the hypothetical number of initial issues for the items in Group 6.	10
Table 9:	The calculated turnover rates for the item groups.	16
Table 10:	The median turnover rates found in each of the two periods, and the results of the statistical tests. Those results found to be statistically significant are highlighted in bold typeface.	22
Table 11:	The total costs of the DEU system, separated into costs due to the initial issues, and costs for all other clients, with all associated geometric means and growth rates.	23
Table 12:	Populations of the total DEU clients, and initial issue clients in each fiscal year, with associated geometric means and growth rates.	24
Table 13:	The absolute and relative contributions to the increases in the costs of the DEU system.	24
Table 14:	The median turnover rates found in each of the two periods, and the results of the statistical tests. Those results with statistically significant differences are highlighted in bold typeface.	26
Table A.1:	The items provided to female individuals entering the Air Force as NCMs. . . .	31
Table A.2:	The items provided to male individuals entering the Air Force as NCMs.	32
Table A.3:	The items provided to female individuals entering the Air Force as Officers. . .	33

Table A.4:	The items provided to male individuals entering the Air Force as Officers.	34
Table A.5:	The items provided to female individuals entering the Army as NCMs.	35
Table A.6:	The items provided to male individuals entering the Army as NCMs.	36
Table A.7:	The items provided to female individuals entering the Army as Officers.	37
Table A.8:	The items provided to male individuals entering the Army as Officers.	38
Table A.9:	The items provided to female individuals entering the Navy as NCMs.	39
Table A.10:	The items provided to male individuals entering the Navy as NCMs.	40
Table A.11:	The items provided to female individuals entering the Navy as Officers.	41
Table A.12:	The items provided to male individuals entering the Navy as Officers.	42
Table B.1:	The number of new recruits in the CF, separated by service and rank level.	43
Table B.2:	The number of personnel changing services in the CF, separated by service and rank level.	43
Table B.3:	The number of personnel in the CF, separated by service and rank level.	44
Table C.1:	The items in aggregate group 1: AW Coats.	45
Table C.2:	The items in aggregate group 2: Femoral Wear.	46
Table C.3:	The items in aggregate group 3: HW, LW Coats.	47
Table C.4:	The items in aggregate group 4: Raincoats.	47
Table C.5:	The items in aggregate group 5: Shirts.	48
Table C.6:	The items in aggregate group 6: Shoes.	48
Table C.7:	The items in aggregate group 7: Sweaters.	49

List of figures

Figure 1:	The computed turnover rates for the All-Weather Coats.	17
Figure 2:	The computed turnover rates for the Femoral Wear.	18
Figure 3:	The computed turnover rates for the Heavyweight and Lightweight Coats. . . .	18
Figure 4:	The computed turnover rates for the Raincoats.	19
Figure 5:	The computed turnover rates for the Shirts.	19
Figure 6:	The computed turnover rates for the Shoes.	20
Figure 7:	The computed turnover rates for the Sweaters.	20
Figure 8:	The increases in the individual costs of all DEU items.	25
Figure 9:	The increases in the individual costs of the items in the groups and aggregate groups studied.	27

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1 Introduction

“It is an interesting question how far men would retain their relative rank if they were divested of their clothes.”

— Henry David Thoreau

1.1 Background and Context

Since 1986, members of the Canadian Forces (CF) have been issued uniforms distinctive to their environment known as the *Distinctive Environmental Uniform* (DEU). While the term “DEU” refers to all the different environmental uniforms, in practical usage it refers to what is more properly known as *Service Dress*. Also called the “duty uniform”, the DEU is the military equivalent of the business suit. The uniforms range from the tunic-necktie-undress ribbons to the more informal short-sleeve shirt dress. Of particular note is the fact that DEU does not generally include Operational Dress items (e.g., CADPAT combat uniforms).

In 2005, the CF changed the way in which Regular Force members acquire DEU items. A monthly monetary allowance, known as the *Clothing Upkeep Allowance* (CUA), was replaced with a clothing replacement system based on the individual accrual of points. This change was necessitated by a shift in the usage of clothing by the CF, from daily usage of DEU by the majority of the Regular forces, to the widespread use of operational clothing, which is replaced on an exchange basis. As a result, it became necessary to modernize the system for replacing DEU items [1].

The points-based system was designed to allow the CF to continue to meet its mandate to provide DEU items to its clients (the members of the CF), while saving DND millions of dollars annually through the use of this system in lieu of the CUA. The number of points allocated to a member depends on the individual’s usual dress of the day – one tier applies to personnel in units that usually wear DEU (who are usually allocated 600 points annually), while another tier applies to individuals in units that usually wear operational clothing (who are usually allocated 200 points annually). Personnel are able to accumulate up to 1200 points, which is equal to the approximate point value required to replace an individual’s complete set of DEU items. Moreover, members cannot have an unspent balance of points in their accounts paid out in cash (even if they accumulate the allowable maximum of 1200 points) [3]. The number of points required for each item is based on a formula that takes into account the estimated frequency of replacement for each DEU item as well as its replacement cost.

By September 2005, the change in the DEU clothing system (from the CUA-based system to the current point-based system) was complete for the Regular force, and by April 2006 the same was true of the Reserve force.

1.2 The Tasking

The overall costs of the DEU clothing system have increased in the years since its change from the CUA-based system to the points-based system. The annual (calendar year) costs of the system are provided in Table 3.

Table 3: Annual (calendar year) costs of the DEU Clothing System, in nominal CAD.

Calendar Year	Total Annual Cost (\$)	Total increase since 2000
2000	15,962,556	—
2001	18,650,894	17%
2002	16,010,404	0%
2003	14,439,439	-10%
2004	13,272,082	-17%
2005	21,652,065	36%
2006	30,379,651	90%
2007	29,927,529	87%
2008	30,206,792	89%
2009	34,771,986	118%

Note that the cost of the system has more than doubled in the nine year period presented in the table. Several explanations have been offered to account for this difference: personnel may have been retaining a portion of their monetary allowance in the old system, leading to an artificially reduced demand for DEU items; some personnel may be given an incentive to replace their DEU items at a faster rate than is necessary due to the maximum possible accumulation of points in the new system, amongst other possible reasons.

The Directorate of Materiel Group Operational Research (DMGOR) was tasked in September 2009 by the Deputy Chief of Staff Materiel (DCOS(Mat)) to examine if the perceived difference in the costs of the DEU clothing system was due to increased demand by the DEU clients. The approach undertaken by DMGOR was to calculate the per-capita turnover rates for several major groups of DEU items in the old system and the new system, and to determine if these rates have changed with any statistical significance. The annual costs of the DEU system were studied to determine if increased demand of the DEU items was responsible for increased costs of the system, and the relative contributions of several factors resulting in the increases in the overall costs were identified.

1.3 Structure of the Report

This report is divided into five sections and three annexes. Following the introduction, Section 2 provides information on the datasets used in the analysis (with additional details provided in Annexes A, B, and C), and presents how the turnover rates are calculated. The statistical tests are also discussed in this section, as are the assumptions and limitations of the methodology, and the approach used to explore the increases in costs of the system. Results of the analysis can be found in Sections 3 and 4, and the report terminates in Section 5 with recommendations and concluding statements.

2 The Methodology

A detailed exposition of the datasets concerning the DEU system is provided in Section 2.1. Calculations concerning the turnover rates, which represent the average quantity of items requested by each individual who could use such items, are presented in Section 2.2. Section 2.2.3 provides information on the statistical tests used to determine the significance in the changes in the turnover rates, with details on the assumptions and limitations of the approach provided in Section 2.2.4. Finally, the methodology used to determine the causes for the increases in the total cost of the system is presented in Section 2.3.

2.1 Datasets

The change in the DEU clothing system from a monetary allowance to a points-based system occurred between January 2002 and April 2006 for the various components of the CF. During this period, some units in the CF used the CUA system while others used the points-based system. As the goal of this analysis was to quantify the changes in the turnover rates between these two systems, the only data used for this analysis pertained to the periods wherein the CF was using one of the two DEU systems in exclusivity, and the overlap period was disregarded.

2.1.1 Clothing Online

Prior to 2002, all clothing sales to CF members were handled by physical stores located at military bases across the country. These stores were known, fittingly, as *Clothing Stores*. In 2002, an online system known as *Clothing Online* was created to provide a more effective and efficient delivery system for CF non-operational clothing. This system allows for the online ordering of DEU items, which are then delivered directly to the individual [4].

Clothing Online first became available to Regular Force members in January 2002 in a large-scale trial, and its use became mandatory in September 2004. The system became available to Reserve Force members within the Cadet Instructors Cadre (CIC)¹ on a trial basis in February 2003, and expanded to the remainder of the Reserve component later that year.

The Clothing Stores remain in use by the CF; however, the vast majority of all DEU item transactions are no longer done through the stores, but are instead ordered online (at least 90% by some estimates [5]).

2.1.2 The Clothing Stores and the Clothing Online Datasets

Data on the issues of DEU items to clothing stores, units, and personnel since September 1996 was made available to DMGOR by Director Soldier Systems Program Management (DSSPM) [5]. This data was collected through two sources: the individual Clothing Stores (which was combined centrally into one dataset), and through the Clothing Online software system.

¹The *Cadet Instructors Cadre* (CIC) Branch consists of approximately 7,500 CF officers whose primary duty is the safety, supervision, administration and training of Royal Canadian Sea, Army, and Air cadets.

The Clothing Stores dataset

The dataset concerning the Clothing Stores lists all orders made by each store for the period of September 1996 to December 2009, and is organized by item type. Each entry in this dataset contains several fields listing the type of item ordered,² the quantity ordered, and associated cost information.

The entries in this dataset are comprised of two types of demand, which are not differentiated in the dataset: *replacements* and *initial issues*. Replacements are orders created by personnel to replace worn-out clothing items, while initial issues are items required by members and provided when the members are initially recruited for service, or when they change services.

The Clothing Online dataset

The dataset on the items requested through Clothing Online was provided by the clothing contractor, *Logistik Unicorn Inc.*, via DSSPM staff [5]. This dataset concerns the period from June 2004 to December 2009.

As was the case for the Clothing Stores dataset, all records in this dataset are organized by item type. Each record contains information on the type of item ordered, the quantity ordered, and associated cost information. This dataset has three main components: two components concerning items used as replacements paid for using points or cash;³ and a third component detailing the number of initial issues demanded in each month via the Clothing Online system.

2.1.3 Summary of the Data on DEU Orders

In summary, all DEU orders during the time when the CUA-based system was in exclusive use can be found in the Clothing Stores dataset. This data was available for the months of September 1996 to December 2001. The data on DEU item requests during the exclusive use of the points-based system comes both from the Clothing Online and the Clothing Stores datasets. In this case, data was available for the months of April 2006 to December 2009.

2.1.4 Initial Issues Clients

An additional dataset was provided by DSSPM which concerned the items issued to all personnel as they entered service (either as new recruits, or upon changing services), which are termed the *initial*

²The items are associated with two main types of identifiers: the first is known as a Logistics number, or *Log#*, and is a unique identifier to describe the type of DEU item (for example, a black necktie is associated with *Log#* 280 and a man's black 100% wool v-neck sweater is associated with *Log#* 285). The second is known as a generic NATO Stock Number (NSN), and is a more general identifier used in many aspects of logistics, and not merely the DEU system. Continuing the example above, a black necktie is associated with *Generic NSN* 1000-21-280-0280 and a man's black 100% wool v-neck sweater is associated with *Generic NSN* 8405-20-000-6790. Moreover, a third identifier (seldom used, and not at all in this report) is the *Specific NSN*, which allows one to differentiate amongst several items of the same type according to their size, or any of their other characteristics.

³As can be expected due to the change from the CUA-based system to a points-based system, the number of items paid for in cash has decreased dramatically over the years. The vast majority of transactions are now performed using the point system.

issues clients. The set of items which are given to these individuals is dependent on several characteristics relating to the individual: the member’s gender, rank level (Officer or Non-Commissioned Member (NCM)), and service (Navy, Army, or Air Force). This dataset is separated based on these characteristics – as such, there are $2 \times 2 \times 3 = 12$ lists of the items provided to these individuals (one for each combination of the two genders, two rank levels, and three services). These lists are provided in Annex A.

2.1.5 Demographics Data

Demographical information on the CF required for use in this study was provided by Director General Military Personnel Research and Analysis (DGMPPRA) [6]. More specifically, DGMPPRA staff provided information on the total number of DEU clients, which is simply the number of personnel in each service; and the number of initial issues clients, which is the sum of the number of new recruits in each service and the total number of personnel changing service. This data was provided for the years of 1996/97 to 2009/10, aggregated by fiscal year and separated by service and rank level.

The complete dataset is provided in Annex B. A summary of this dataset is provided in Table 4, which lists the total number of DEU clients and the total number of initial issues clients in each year. It is interesting to note that while the average number of DEU clients has increased by only 10% in the years in which the points-based system was used over those in which the CUA-based system was used, the average number of initial issues clients has more than doubled over this period – an average increase of 128%.

Table 4: A summary of the demographics dataset.

	Fiscal Year						
	CUA-based DEU system				points-based DEU system		
	1997/98	1998/99	1999/00	2000/01	2006/07	2007/08	2008/09
Total Initial Issues clients	2,972	3,366	3,355	3,860	7,169	7,721	8,280
Total DEU clients	61,086	59,642	58,351	57,606	64,160	64,838	65,970

2.2 Turnover Rate Calculations

Several DEU items fulfill the same role and may be used interchangeably – for example, male officers in the Navy use both lightweight white trousers and heavyweight black trousers. Moreover, the gender of the personnel making requisitions for DEU items in either of the two clothing datasets (the Clothing Stores dataset, and the Clothing Online dataset) was not available to the author. As such, it is not sensible to study their turnover rates individually, but instead to combine their usage, and calculate their turnover in a combined fashion. Hence, the turnover rates were calculated for several *groups* of items instead of calculating the per-capita turnover rates for each individual DEU item. Continuing the example above, a group of DEU items was created to represent all trousers,

slacks, and skirts worn by personnel in the Navy. The 10 items which comprise this group are given in Table 5.

Table 5: Items in the trousers, slacks, and skirts group for personnel in the Navy.

Log#	NSN Generic	Description
27	8405-21-899-0359	TROUSERS, MAN'S, SD, LIGHTWEIGHT, WHITE
28	8405-21-899-0420	TROUSERS, MAN'S, SD, HEAVYWEIGHT, BLACK
90	8410-21-899-0681	SKIRT, WOMAN'S, SERVICE DRESS, WHITE, LIGHTWEIGHT
91	8410-21-899-0706	SKIRT, WOMAN'S, SERVICE DRESS, BLACK, HEAVYWEIGHT
92	8410-21-899-0731	SLACKS, WOMAN'S, SERVICE DRESS, WHITE, LIGHTWEIGHT
93	8410-21-899-0756	SLACKS, WOMAN'S, SERVICE DRESS, BLACK, HEAVYWEIGHT
182	8410-21-912-8111	SLACKS, WOMAN'S, SD, LIGHTWEIGHT, SEA, WHITE
185	8410-21-912-8198	SLACKS, WOMAN'S, SD, HEAVYWEIGHT, SEA, BLACK
194	8410-21-913-5090	SKIRT, WOMAN'S, SD, HEAVYWEIGHT, SEA, BLACK
195	8410-21-913-5146	SKIRT, WOMAN'S, SD, LIGHTWEIGHT, SEA, WHITE

Moreover, not all of the 535 DEU items were studied. Instead, the most prominent items in terms of cost and usage in the historical datasets were identified, and were then selected for further study.⁴

In all, there were a total of 22 groups of items studied, composed of 95 different DEU items. These groups are listed in Table 6, column 3. Note that the items are generally categorized into groups specifying the type of item, as well as the service (Air Force, Army, or Navy) using those items.⁵ These 22 groups were consolidated into seven larger groups (called *aggregate groups*; Table 6, column 1), in order to study the changes in turnover rates across the entire CF instead of within one specific environment. The turnover rates were computed for each of the 22 groups as well as for the seven aggregate groups. A full list of the items contained within each group can be found in Annex C.

In simple terms, the turnover rates are calculated as the total demand for the items (both from Clothing Online and the Clothing Stores), minus the amounts given to the initial issue clients, all divided by the number of personnel who are DEU clients but are not initial issue clients. By removing all data pertaining to the initial issues, the turnover rates are assured to be calculated on a per capita basis for all non-initial issue clients.

All calculations are performed on a fiscal year basis, as the data concerning the total number of DEU clients and the number of initial issue clients does not have any finer resolution. The turnover rates in the CUA system are computed for fiscal years 1997/98, 1998/99, 1999/00, and 2000/01. The corresponding rates for the points-based system are computed for fiscal years 2006/07, 2007/08, and 2008/09.⁶

⁴The aggregate cost of all orders from September 1996 to December 2009 were computed for each DEU item. The items with the highest aggregate costs were selected for study in this analysis.

⁵A notable exception to this statement is the case of the groups concerning shoes, which are separated according to their colour. However, white shoes are only used by the Navy, whereas all services use black shoes.

⁶These fiscal years are the only ones in the datasets for which there was no overlap between the two DEU systems, as

Table 6: *The groups of items studied.*

Aggregate Group	Group Index	Group Description
1: AW Coats †	1	All-Weather Coats (Air Force)
	2	All-Weather Coats (Army)
	3	All-Weather Coats (Navy)
2: Femoral Wear	4	Trousers, Slacks, and Skirts (Air Force)
	5	Trousers, Slacks, and Skirts (Army)
	6	Trousers, Slacks, and Skirts (Navy)
3: HW, LW Coats ‡	7	Heavyweight Coats (Air Force)
	8	Lightweight Coats (Air Force)
	9	Heavyweight Coats (Army)
	10	Lightweight Coats (Army)
	11	Heavyweight Coats (Navy)
4: Raincoats	12	Raincoats (Air Force)
	13	Raincoats (Army)
	14	Raincoats (Navy)
5: Shirts	15	Shirts (Air Force)
	16	Shirts (Army)
	17	Shirts (Navy)
6: Shoes	18	Shoes (Black)
	19	Shoes (White)
7: Sweaters	20	Sweaters (Air Force)
	21	Sweaters (Army)
	22	Sweaters (Navy)

† AW: All-Weather

‡ HW: Heavyweight; LW: Lightweight

In the years with the points-based system, the initial issues are included exclusively in the Clothing Online dataset, and are separated from the rest of the orders used as replacements. However, in the period under the CUA system, the initial issues are included in the data within the Clothing Stores dataset. Hence, the number DEU items of each type issued to initial issue clients during the period of the CUA system was unknown to DSSPM, and hence unavailable to the author. As it was necessary to separate the items used as initial issues from the remainder of the orders, the *hypothetical quantities of initial issues* were computed for each DEU item based on the number of initial issues clients in each year and the items that they are each issued.

Mathematically, the way in which the turnover rates are calculated for each fiscal year is presented in Section 2.2.1 for the interested reader.

2.2.1 Mathematical Presentation of the Turnover Calculations

The definitions of all indices, constants, and computed rates are provided below.

Indices

- x index of the DEU item, $x \in \{1, \dots, 535\}$
- y fiscal year, $y \in \{1997/98, \dots, 2008/09\}$
- G item group, $G \in \{G_1, \dots, G_{22}\}$

Constants

- $Q_{CS}(x, y)$ quantity of items of type x sold in year y by the Clothing Stores
- $Q_{CO, Points}(x, y)$ quantity of items of type x sold in year y through Clothing Online using points
- $Q_{CO, Sales}(x, y)$ quantity of items of type x sold in year y through Clothing Online using cash
- $Q_{CO, II}(x, y)$ quantity of items of type x provided to initial issue clients in year y through Clothing Online
- $Q_{HypoII}(x, y)$ hypothetical quantity of items of type x demanded in year y by the initial issue clients
- $P_{Total}(G, y)$ total number of personnel using any of the items in group G in year y
- $P_{II}(G, y)$ total number of initial issue clients using any of the items in group G in year y

was explained in Section 2.1.3.

Computed Rates

- $\Gamma_{CUA}(G, y)$ turnover rate of item group G in year y , where year y used the CUA-based DEU system
- $\Gamma_{Points}(G, y)$ turnover rate of item group G in year y , where year y used the points-based DEU system

Note that each of the constants, save $Q_{HypoII}(x, y)$, are provided in the datasets mentioned in Section 2.1. More specifically, the constants $Q_{CS}(x, y)$ are given in the Clothing Stores dataset; the constants $Q_{CO, Points}(x, y)$, $Q_{CO, Sales}(x, y)$, and $Q_{CO, II}(x, y)$ are given in the Clothing Online dataset; and the constants $P_{Total}(G, y)$ and $P_{II}(G, y)$ were provided by DGMPPRA in the demographics dataset.

The constants $Q_{HypoII}(x, y)$ were computed using the hypothetical quantities for initial issues clients, as well as the information on the number of initial issues clients in the demographics dataset.

The turnover rates were computed for the item group G under the CUA-based system (i.e., fiscal years 1997/98, 1998/99, 1999/00, and 2000/01) using Equation 1, while the corresponding rates for the points-based system (i.e., fiscal years 2006/07, 2007/08, and 2008/09) were computed using Equation 2.

$$\Gamma_{CUA}(G, y) = \frac{\sum_{x \in G} Q_{CS}(x, y) - \sum_{x \in G} Q_{HypoII}(x, y)}{P_{Total}(G, y) - P_{II}(G, y)} \quad (1)$$

$$\Gamma_{Points}(G, y) = \frac{\sum_{x \in G} Q_{CO, Points}(x, y) + \sum_{x \in G} Q_{CO, Sales}(x, y) + \sum_{x \in G} Q_{CS}(x, y)}{P_{Total}(G, y) - P_{II}(G, y)} \quad (2)$$

Note that the constants $Q_{CO, II}(x, y)$ are not used in the turnover rate calculations, as the calculations concern only items provided to personnel *not* as initial issues. Moreover, these constants are simply the product of the number of initial clients in the year ($P_{II}(G, y)$) and the number of items of type x given to those personnel as initial issues.

2.2.2 An Example of the Turnover Calculations

In order to illustrate the turnover rate computations, the calculations for Group 6 (denoted here as G_6) are provided here. This group is the set of all trousers, slacks, and skirts worn by personnel in the Navy (see Table 5 for a complete list). The numbers of items in this group ordered through the Clothing Stores and through Clothing Online (but not provided as initial issues through Clothing Online) are presented in Table 7.

Personnel are each given 4 items from this group upon entering the Navy: the women are provided one pair of lightweight white slacks (Log# 182), one pair of heavyweight black slacks (Log# 185), one heavyweight black skirt (Log# 194), and one lightweight white skirt (Log# 195); whereas the men are provided two pairs of lightweight white trousers (Log# 27), and two pairs of heavyweight

Table 7: The quantities of items in Group 6 (Trousers, Slacks, and Skirts (Navy)) ordered through the Clothing Stores, or via Clothing Online.

Fiscal Year (y)	Clothing Stores ($\sum_{x \in G_6} Q_{CS}(x, y)$)	Clothing Online	
		Points ($\sum_{x \in G_6} Q_{CO, Points}(x, y)$)	Sales ($\sum_{x \in G_6} Q_{CO, Sales}(x, y)$)
1997/98	15,523	–	–
1998/99	13,965	–	–
1999/00	20,669	–	–
2000/01	11,970	–	–
2006/07	999	13,571	104
2007/08	364	14,889	98
2008/09	284	16,120	74

black trousers (Log# 28). Hence, the assumed number of initial issues in each year is equal to four times the number of initial issues clients. The number of DEU clients, the number of initial issue clients, and the assumed (hypothetical) number of initial issues for the items in this group are presented in Table 8.

Table 8: The number of DEU clients, the number of initial issue clients, and the hypothetical number of initial issues for the items in Group 6.

Fiscal Year (y)	Total DEU Clients ($P_{Total}(G_6, y)$)	Initial Issues Clients ($P_{II}(G_6, y)$)	Hypothetical Initial Issues ($Q_{HypoII}(x, y)$)
1997/98	11,101	421	1,684
1998/99	10,853	586	2,344
1999/00	10,875	737	2,948
2000/01	10,813	662	2,648
2006/07	11,263	860	–
2007/08	11,055	944	–
2008/09	11,069	1,119	–

Equation 1 is used to calculate the turnover rates for the years during the use of the CUA-based DEU system. For example, the turnover rate for the fiscal year 1999/00 is found as follows:

$$\begin{aligned}
 \Gamma_{CUA}(G_6, 1999/00) &= \frac{\sum_{x \in G_6} Q_{CS}(x, 1999/00) - \sum_{x \in G_6} Q_{HypoII}(x, 1999/00)}{P_{Total}(G_6, 1999/00) - P_{II}(G_6, 1999/00)} \\
 &= \frac{20,669 - 2,948}{10,875 - 737} \\
 &= 1.748.
 \end{aligned}$$

This means that the average number of items in group G_6 ordered by members of the Navy in 1999/00, and who did not join the service during that year, was 1.748 items per person.

Conversely, Equation 2 is used to calculate the turnover rates for the years during the use of the points-based DEU system. For example, the turnover rate for the fiscal year 2008/09 is found as follows:

$$\begin{aligned}\Gamma_{Points}(G_6, 2008/09) &= \frac{\sum_{x \in G_6} (Q_{CO, Points}(x, 2008/09) + Q_{CO, Sales}(x, 2008/09) + Q_{CS}(x, 2008/09))}{P_{Total}(G_6, 2008/09) - P_{II}(G_6, 2008/09)} \\ &= \frac{16,120 + 74 + 284}{11,069 - 1,119} \\ &= 1.656.\end{aligned}$$

Hence, the average number of items in group G_6 ordered by members of the Navy in 2008/09, and who did not join the service during that year, was 1.656 items per person.

2.2.3 Statistical Tests

Wilcoxon-Mann-Whitney (WMW) tests were performed on the per-capita turnover rates for each group of DEU items to determine if the median turnover rates have changed in the new system versus the old system with any statistical significance. The WMW test was chosen as it is a non-parametric statistical hypothesis test⁷ for assessing whether one of two samples of independent observations tends to have large values. It is one of the most well-known non-parametric significance tests [7, 8].

The test assumes that all observations from the two sets of data⁸ are independent of one another.⁹ Under the null hypothesis, the distributions of both sets of data are equal, and the probability of an observation from one set of data exceeding an observation from the second set is equal to the probability of an observation from the second set exceeding an observation from the first. Under the alternative hypothesis, the probability of an observation from one population exceeding an observation from the other is not equal to 0.5.

The test involves the calculation of a statistic, called U , whose value is determined by the ranks of the observations of both sets of data when combined into one large set. Using the value of U statistic, the p -value for the test can then be calculated, which represents the probability of getting a value for U at least as extreme as the one found. If the p -value is sufficiently small, the test has found a statistically significant difference between the two sets of data, and that the change in the turnover rates from the CUA-based system to the points-based system is statistically significant.

2.2.4 Key Assumptions and Limitations

In this section, the assumptions inherent in the data and the methodology are described in detail.

⁷Put simply, a statistical test is said to be *non-parametric* if it makes no assumptions regarding the distribution of the data or that the structure of the model is fixed.

⁸In our case, the two sets of data are the turnover rates for the years 1997/98 to 2000/01, and the turnover rates for the years 2006/07 to 2008/09.

⁹More information on the implications of this assumption can be found in Section 2.2.4.

Initial Issues during the CUA years. As discussed in Section 2.2, it was assumed that each initial issue client was provided with exactly the amount of DEU items that they are supposed to receive upon entering service. In reality, there may have been a delay in the provision of the items until the following fiscal year, whereas the analysis does not reflect this possibility.

Number of DEU Items Provided to the Initial Issues Clients. Upon joining the CF, new recruits are given DEU items as specified in Section 2.1.4. According to DSSPM staff, it has been noted on certain occasions that the physical size of certain recruits changed during basic training, which caused these recruits to request additional DEU items [2]. This information, however, was anecdotal, and no information was available on the frequency of such an occurrence. Hence this possibility was not considered in the analysis.

Orders from the Clothing Stores. The orders made by the Clothing Stores is not necessarily equal to the number of items requested of them by DEU clients. The DEU clients demand items from the Clothing Stores, which hold local inventory at the bases. As their inventory levels change, the Clothing Stores create orders for DEU items from a central inventory each month, which is reflected in the Clothing Stores dataset.

It was assumed that the number of items held as local inventory in each year was approximately constant, which means that the number of items of each type ordered by the Clothing Stores is equal to the demand placed on these stores from the DEU clients.

Returns made by the Clothing Stores. During the introduction of the Clothing Online system, the Clothing Stores returned a portion of their inventories to the central supplier. It was estimated by DSSPM staff that these returns took place during the period from 2004 to 2005 [2]. More specific data on these returns (such as the quantities returned, and the dates at which they were returned) were not available to DMGOR.

As previously mentioned, it was assumed in the analysis that the initial and final inventory levels held by the Clothing Stores were approximately constant during each of the years studied. As the 2004 and 2005 years were not included in this analysis, the fact that there may have been a discrepancy in the initial and final inventory levels held by the Clothing Stores in 2004 and 2005 was not a factor in this analysis.

Homogeneous demand by the DEU clients. As all data provided to DMGOR was aggregated by rank level and service, it was not possible to determine how the demand varied across individual DEU clients. Hence the analysis dealt solely with the mean demand per capita and did not attempt to consider the variance in demand in the population.

Independence of the Turnover Rates. The statistical test used to determine the significance of the difference in the turnover rates assumed that these rates were independent of one another. Although this might not be the case for any given individual (for example, if someone orders a coat in one year, it is less likely that they request an additional coat the next year); this assumption would not have a large effect on the results as the number of DEU clients is quite large. These deviations in turnovers amongst the clients were assumed to cancel each other out.

2.3 Costs of the DEU System

The approach used to determine the potential changes in the demand of the items was outlined in the previous section. The methodology used to determine the causes for the increases in the total cost of the system is presented in this section.

2.3.1 Costs due to the Initial Issues Clients and the non-Initial Issues Clients

Data on the costs of the requisitioned items is provided in the Clothing Stores and the Clothing Online datasets. The total cost of the items provided as initial issues in each of the fiscal years studied was determined as the product of these figures, the quantities of items issued to each of the initial issues clients (specified in Annex A), and the number of these clients (provided in Annex B).

Moreover, the fraction of the total costs of the DEU system due to initial issues in each fiscal year was also calculated. Furthermore, the *compound annual growth rate* (CAGR) of the initial issues – a measure of the smoothed annualized increase in the cost of these issues – was computed.

The differences between the total costs and the costs due to the initial issues clients, which are simply the costs due to the non-initial issues clients, were also computed. The CAGR for these costs (i.e., due to the non-initial issues clients) was also calculated. These increases in costs were then compared to the increases in the population of the non-initial issues clients. The way in which these calculations were performed is presented in Section 2.3.2 for the interested reader.

2.3.2 Mathematical Presentation of the Costs Calculations

The definitions of all indices, constants, and computed cost metrics are provided below.

Indices

x index of the DEU item, $x \in \{1, \dots, 535\}$

y fiscal year, $y \in \{1997/98, \dots, 2008/09\}$

Constants

$Q_{CS}(x,y)$ quantity of items of type x sold in year y by the Clothing Stores

$Q_{CO,Points}(x,y)$ quantity of items of type x sold in year y through Clothing Online using points

$Q_{CO,Sales}(x,y)$ quantity of items of type x sold in year y through Clothing Online using cash

$Q_{CO,II}(x,y)$ quantity of items of type x provided to initial issue clients in year y through Clothing Online

- $C(x, y)$ average cost of items of type x in year y
- $N_{(Gdr, Rnk, Svc)}(x)$ number of items of type x provided to each initial issues client of gender Gdr , rank Rnk , and service Svc
- $P_{II(Gdr, Rnk, Svc)}(y)$ number of initial issues clients of gender Gdr , rank Rnk , and service Svc in year y

Computed Cost Metrics

- $C_{Total}(y)$ total cost of the DEU system in year y
- $C_{II}(y)$ total cost of the initial issues in year y
- $AvgC_{Total}(CUA)$ Average annual total cost of the DEU system during the CUA-based period
- $AvgC_{Total}(Points)$ Average annual total cost of the DEU system during the points-based period
- $AvgC_{II}(CUA)$ Average annual cost of the initial issues during the CUA-based period of the DEU system
- $AvgC_{II}(Points)$ Average annual cost of the initial issues during the points-based period of the DEU system
- $CAGR_{Total}$ compound annual growth rate of the total costs of the system
- $CAGR_{II}$ compound annual growth rate of the costs of the initial issues

Note that each of the constants are provided in the datasets mentioned in Section 2.1. More specifically, the constants $Q_{CS}(x, y)$, $Q_{CO, Points}(x, y)$, $Q_{CO, Sales}(x, y)$, and $Q_{CO, II}(x, y)$ are identical to those defined in Section 2.2.1; the constants $C(x, y)$ can be found in the Clothing Stores and Clothing Online datasets; the number of items provided to the initial issues clients specified in $N_{(Gdr, Rnk, Svc)}(x)$ can be found in Annex A; and the constants $P_{II(Gdr, Rnk, Svc)}(y)$ were provided by DGMPRA in the demographics dataset.

As was the case for the turnover rate calculations, the calculations in this section assume that the CUA-based period of the DEU system is comprised of the fiscal years 1997/98, 1998/99, 1999/00, and 2000/01; whereas the points-based period is comprised of the fiscal years 2006/07, 2007/08, and 2008/09.

The total costs of the DEU system were computed using Equation 3; the portion of the costs associated with initial issues was computed using Equation 4.

$$C_{Total}(y) = \sum_x C(x, y) (Q_{CS}(x, y) + Q_{CO, Points}(x, y) + Q_{CO, Sales}(x, y) + Q_{CO, II}(x, y)) \quad (3)$$

$$C_{II}(y) = \sum_x C(x, y) \sum_{Gdr, Rnk, Svc} N_{(Gdr, Rnk, Svc)}(x) P_{II(Gdr, Rnk, Svc)}(y) \quad (4)$$

The average costs of the DEU system, as well as the portion associated to initial issues, were computed using Equations 5 to 8. Note that the average costs were computed as geometric means

of the costs in the years in question.

$$AvgC_{Total}(CUA) = (C_{Total}(1997/98) C_{Total}(1998/99) C_{Total}(1999/00) C_{Total}(2000/01))^{\frac{1}{4}} \quad (5)$$

$$AvgC_{Total}(Points) = (C_{Total}(2006/07) C_{Total}(2007/08) C_{Total}(2008/09))^{\frac{1}{3}} \quad (6)$$

$$AvgC_{II}(CUA) = (C_{II}(1997/98) C_{II}(1998/99) C_{II}(1999/00) C_{II}(2000/01))^{\frac{1}{4}} \quad (7)$$

$$AvgC_{II}(Points) = (C_{II}(2006/07) C_{II}(2007/08) C_{II}(2008/09))^{\frac{1}{3}} \quad (8)$$

Finally, the compound annual growth rate of the total costs of the system and the initial issues portion were computed using Equations 9 and 10. Note that term 8.5 in the expressions results from the fact that the midpoint of the CUA period is 8.5 years before the midpoint of the points-based period.

$$CAGR_{Total} = \left(\frac{AvgC_{Total}(Points)}{AvgC_{Total}(CUA)} \right)^{\frac{1}{8.5}} - 1 \quad (9)$$

$$CAGR_{II} = \left(\frac{AvgC_{II}(Points)}{AvgC_{II}(CUA)} \right)^{\frac{1}{8.5}} - 1 \quad (10)$$

2.3.3 Increases in Costs of the Items

As well as calculating the increases in costs of the DEU system as a whole, the changes in the costs of the individual items over the years was also calculated. More specifically, the average cost of each item was calculated for each period of the DEU system – the CUA-based period, and the points-based period. The increase in the average cost of each type of DEU item was then determined, and the corresponding CAGR for each item type was computed in the same fashion that the overall CAGR of the DEU system was calculated (presented in Section 2.3.2). Moreover, increases in the costs of the item groups were determined by taking weighted averages of the costs of the items within the group, where the weights used were the quantities of each item demanded in the group.

Using these calculated growth rates, a non-parametric test was used to test for correlations between differences in the demand of the items and price increases of the items. More specifically, using a WMW test, it was determined whether or not those item groups, where statistically significant differences in demand were found between the two DEU systems, were more likely to have higher or lower CAGRs than the other item groups.

3 Results on Turnover Rates

The turnover rates were calculated for each of the item groups and aggregate groups in each of the years under study. These calculated rates can be found in Table 9. The results in this table should be read as follows: the per-capita turnover rate for AW Coats (Navy) in fiscal year 2007/08 was 0.073.

Table 9: The calculated turnover rates for the item groups.

Group Description	Fiscal Year						
	CUA-based DEU system				points-based DEU system		
	1997/98	1998/99	1999/00	2000/01	2006/07	2007/08	2008/09
AW Coats (Air Force)	0.081	0.056	0.034	0.035	0.073	0.049	0.051
AW Coats (Army)	0.076	0.041	0.009	0.035	0.095	0.058	0.061
AW Coats (Navy)	0.199	0.137	0.041	0.063	0.091	0.073	0.068
<i>AW Coats, aggregate</i>	0.100	0.064	0.024	0.041	0.087	0.058	0.059
Femoral Wear (Air Force)	0.678	0.480	0.932	0.605	0.789	0.729	0.776
Femoral Wear (Army)	0.898	0.540	0.553	0.362	0.584	0.529	0.545
Femoral Wear (Navy)	1.296	1.132	1.748	0.918	1.411	1.518	1.656
<i>Femoral Wear, aggregate</i>	0.889	0.626	0.906	0.548	0.799	0.767	0.808
HW Coats (Air Force)	0.121	0.076	0.146	0.095	0.079	0.060	0.065
LW Coats (Air Force)	0.192	0.121	0.167	0.141	0.169	0.151	0.146
HW Coats (Army)	0.261	0.188	0.271	0.183	0.271	0.241	0.243
LW Coats (Army)	0.200	0.225	0.000	0.000	0.000	0.000	0.000
HW Coats (Navy)	0.285	0.177	0.161	0.143	0.249	0.204	0.205
<i>HW, LW Coats, aggregate</i>	0.391	0.306	0.279	0.205	0.292	0.256	0.258
Raincoats (Air Force)	0.080	0.071	0.132	0.055	0.059	0.048	0.050
Raincoats (Army)	0.060	0.006	0.130	0.098	0.101	0.053	0.056
Raincoats (Navy)	0.160	0.088	0.304	0.206	0.149	0.133	0.099
<i>Raincoats, aggregate</i>	0.086	0.045	0.163	0.104	0.097	0.066	0.062
Shirts (Air Force)	2.822	2.471	2.295	2.087	1.625	1.557	1.610
Shirts (Army)	3.520	6.521	0.609	0.581	1.316	1.207	1.279
Shirts (Navy)	4.024	4.507	4.643	2.890	4.794	4.947	5.124
<i>Shirts, aggregate</i>	3.354	4.679	1.942	1.521	2.048	1.979	2.045
Shoes (Black)	0.162	0.134	0.162	0.189	0.224	0.195	0.191
Shoes (White)	0.109	0.125	0.148	0.112	0.149	0.168	0.172
<i>Shoes, aggregate</i>	0.173	0.148	0.179	0.196	0.223	0.198	0.193
Sweaters (Air Force)	0.123	0.094	0.129	0.147	0.228	0.206	0.210
Sweaters (Army)	0.367	0.158	0.368	0.598	0.205	0.171	0.182
Sweaters (Navy)	0.292	0.357	0.330	0.250	0.470	0.407	0.415
<i>Sweaters, aggregate</i>	0.263	0.171	0.277	0.381	0.261	0.224	0.231

The turnover rates for each of the item groups are illustrated graphically in Figures 1 through 7. Each of these figures includes all turnover rates for one specific aggregate group. For example, the turnover rates for Air Force sweaters, Army sweaters, Navy sweaters, and all sweaters as an

aggregate group are shown in Figure 7. Note that there is a large gap in the figures from the fiscal year 2001/02 to 2005/06, which are the years in which there was an overlap in the type of DEU system in use. The turnover rates for those years were not calculated.

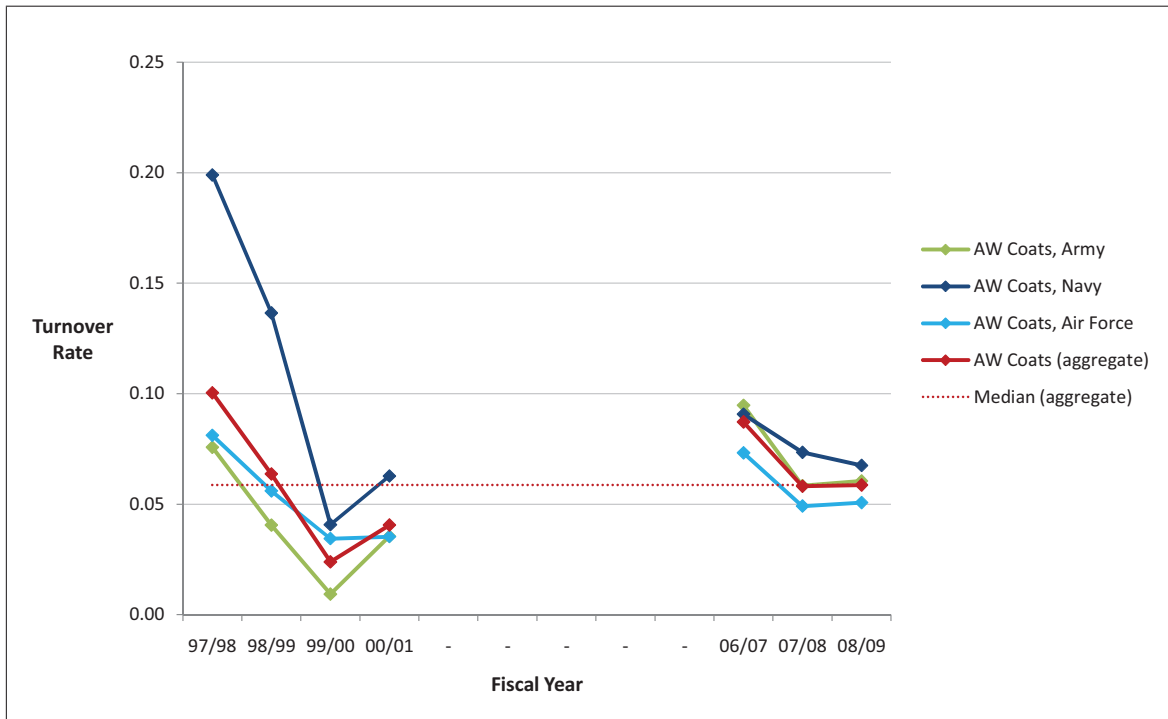


Figure 1: The computed turnover rates for the All-Weather Coats.

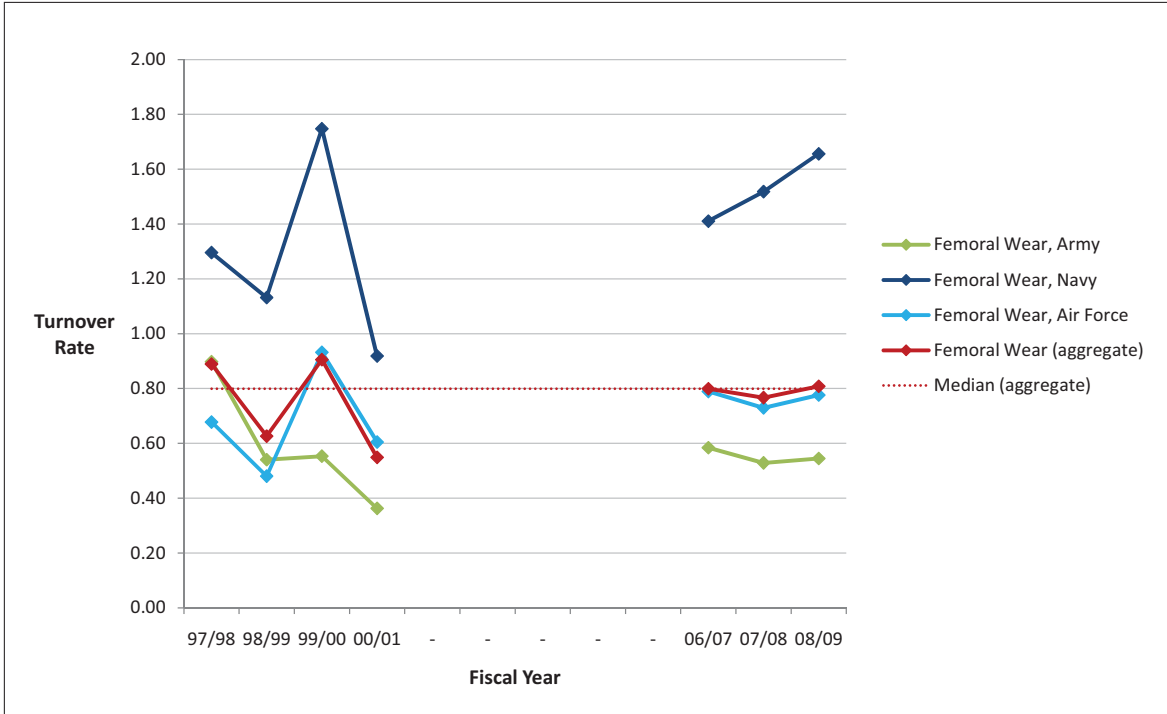


Figure 2: The computed turnover rates for the Femoral Wear.

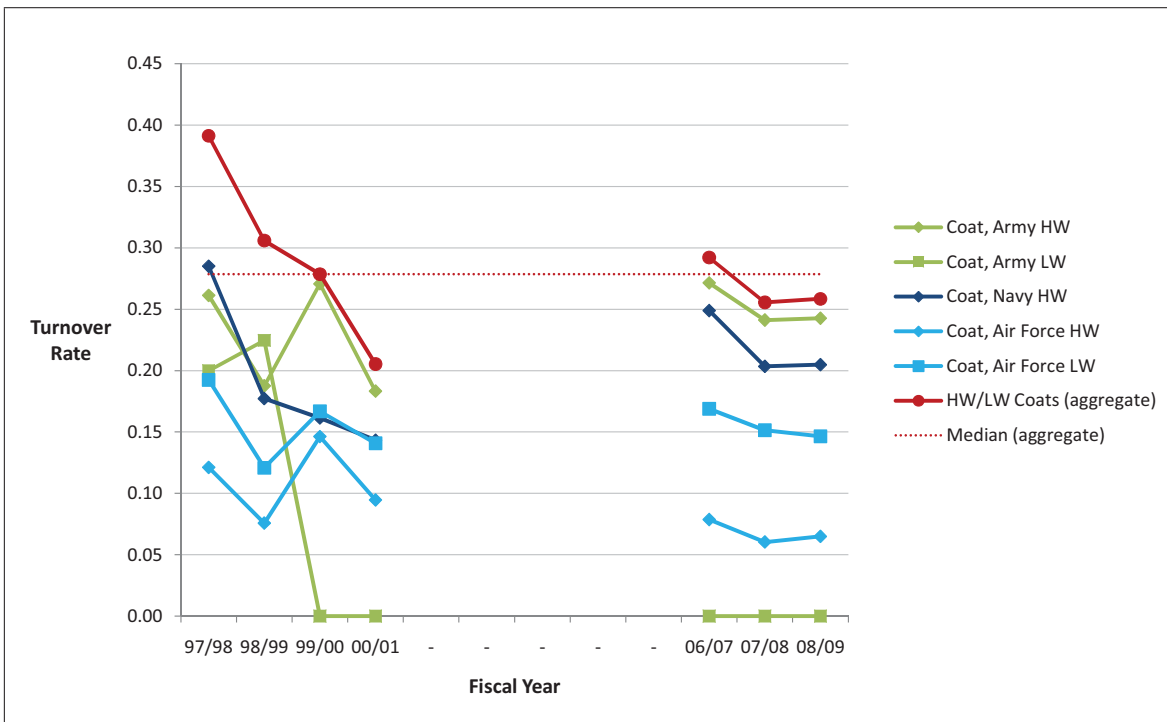


Figure 3: The computed turnover rates for the Heavyweight and Lightweight Coats.

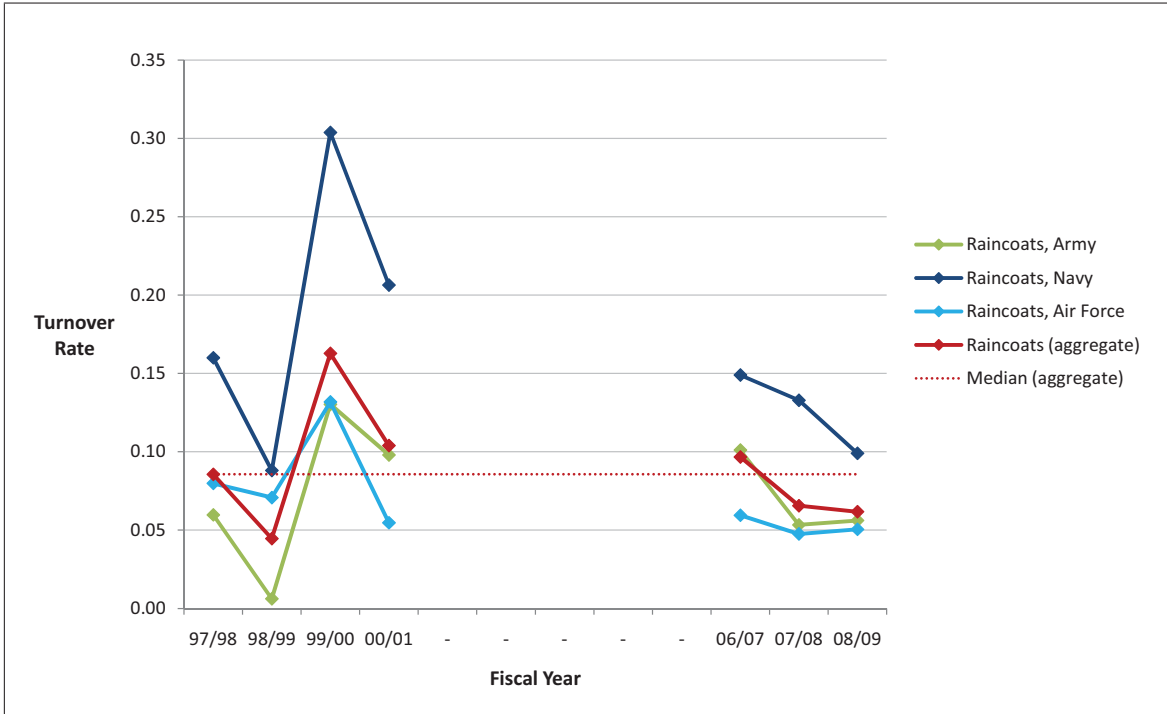


Figure 4: The computed turnover rates for the Raincoats.

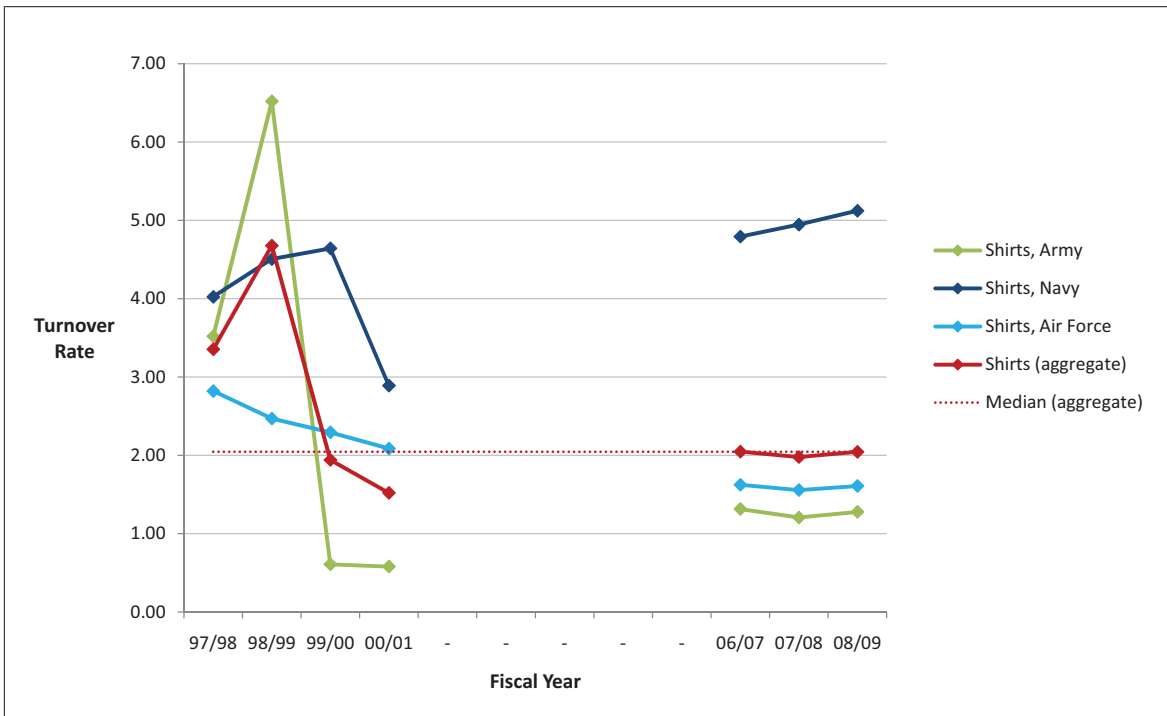


Figure 5: The computed turnover rates for the Shirts.

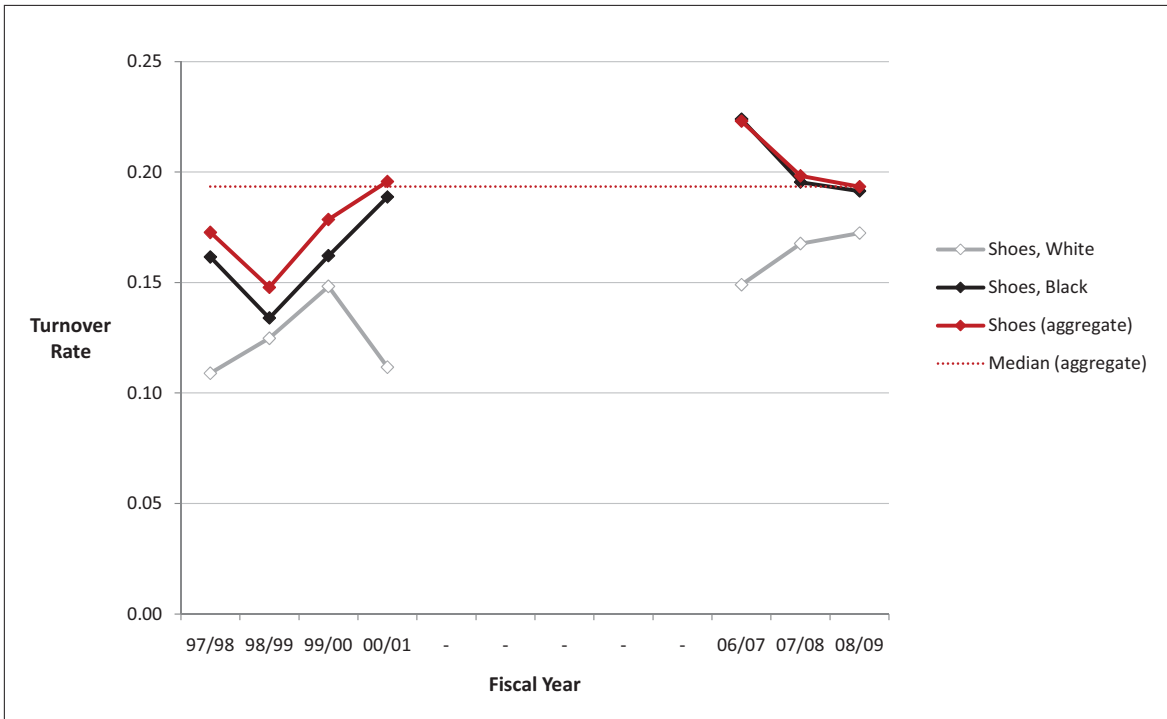


Figure 6: The computed turnover rates for the Shoes.

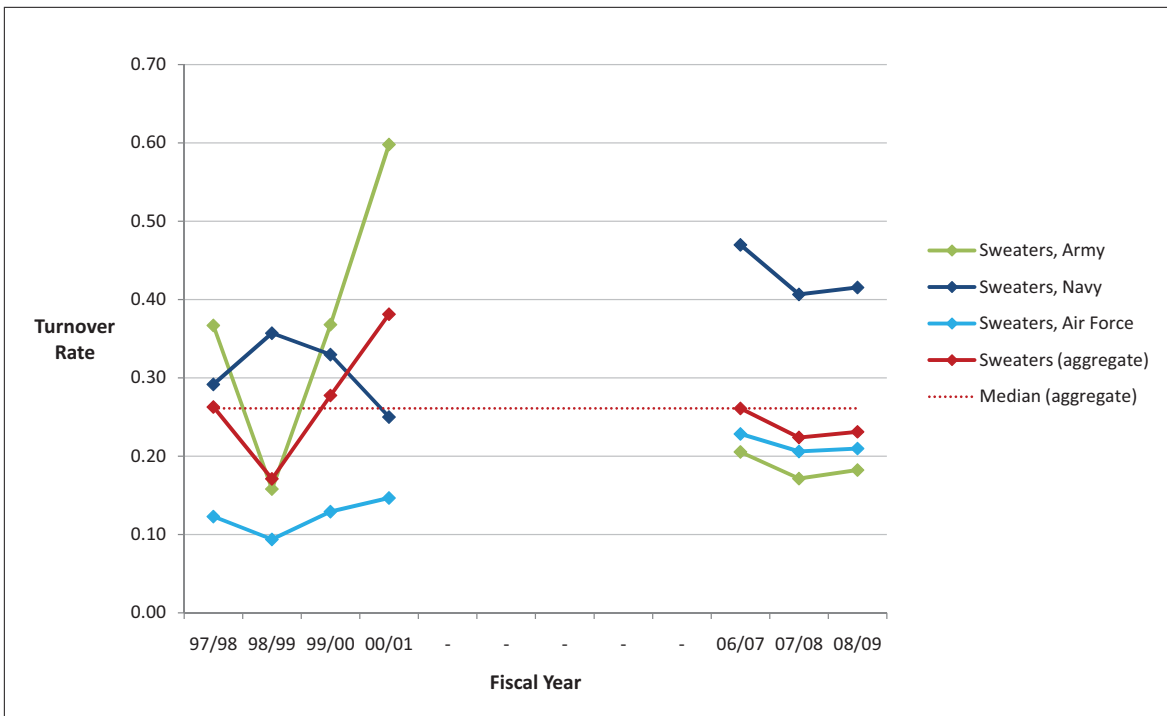


Figure 7: The computed turnover rates for the Sweaters.

3.1 Results of the Statistical Tests

The results of the WMW tests for each of these item groups and aggregate groups is provided in Table 10. The results are provided in terms of the p -values found by the tests, along with the median turnover rates found in each of the two periods studied: the period under the CUA-based system, and the period under the points-based system. Generally, finding a p -value less than 0.05 signifies that the test has found a statistically significant difference between the turnover rates computed in the CUA-based DEU system versus those found in the points-based DEU system, and that the null hypothesis should be rejected. At this level ($\alpha = 0.05$) there is a low chance (less than 5%) of erroneously rejecting the null hypothesis. Those p -values demonstrating statistical significance at this level are highlighted in this table in bold typeface.

It was found that there were no significant differences for any of the aggregate groups, although there were a few statistically significant differences for individual environment-specific item groups, and the WMW test was inconclusive for one item group (LW Coats (Army)) due to a lack of data.¹⁰ More specifically, a total of 7 statistically significant differences were found among the 29 item groups and aggregate groups studied, which correspond to the following item groups: Raincoats (Air Force), Raincoats (Navy), Shirts (Navy), Shoes (Black), Shoes (White), Sweaters (Air Force), and Sweaters (Navy).

Furthermore, the fraction of the total costs of the DEU system occupied by these items (for which significant differences in the turnover rates were found) was determined. This fraction was 31% during the CUA-based period of the DEU system, and 28% during the points-based period of the DEU system.

3.2 A Comparison to Parametric Techniques

Note that due to its non-parametric nature, the WMW test is a weaker test than its parametric analogue, *Student's t-test*, which tests the null hypothesis that the difference between two sets of data has a mean value of zero. However, this test assumes normality of the data (i.e., that the data follows a Normal distribution), which is not an assumption made by the WMW test.

If one were to postulate that the distribution of the turnover rates were indeed Gaussian,¹¹ then an analysis with the t -test could be performed on the data. Doing so would find only one additional significant difference at the $\alpha = 0.05$ level, for the item group HW Coats (Air Force).

This result implies that there is powerful evidence there is indeed no significant difference in the turnover rates in cases where the WMW tests did not find a significant difference. In other words, in the vast majority of the cases (21 of 22) cases where no difference in the median turnover rate was found between the two time periods, it was likely not due to the lack of an assumption for normality of the data.

¹⁰The variance of the turnover rates in the points-based time period for this item group was zero, which caused the WMW test to be inconclusive in this case.

¹¹Small samples almost always pass a normality test. Standard normality tests have little power to tell whether or not a small sample of data comes from a Gaussian distribution.

Table 10: The median turnover rates found in each of the two periods, and the results of the statistical tests. Those results found to be statistically significant are highlighted in bold typeface.

Group Description	Median turnover		<i>p</i> -value
	CUA-based	points-based	
AW Coats (Air Force)	0.046	0.051	0.596
AW Coats (Army)	0.038	0.061	0.111
AW Coats (Navy)	0.100	0.073	0.860
<i>AW Coats, aggregate</i>	0.052	0.059	0.596
Femoral Wear (Air Force)	0.641	0.776	0.216
Femoral Wear (Army)	0.546	0.545	0.860
Femoral Wear (Navy)	1.214	1.518	0.216
<i>Femoral Wear, aggregate</i>	0.758	0.799	0.860
HW Coats (Air Force)	0.108	0.065	0.111
LW Coats (Air Force)	0.154	0.151	0.596
HW Coats (Army)	0.224	0.243	0.480
LW Coats (Army)	0.100	0.000	— †
HW Coats (Navy)	0.169	0.205	0.216
<i>HW, LW Coats, aggregate</i>	0.292	0.258	0.596
Raincoats (Air Force)	0.075	0.050	0.020
Raincoats (Army)	0.079	0.056	0.860
Raincoats (Navy)	0.183	0.133	0.022
<i>Raincoats, aggregate</i>	0.095	0.066	0.596
Shirts (Air Force)	2.383	1.610	0.052
Shirts (Army)	2.064	1.279	0.860
Shirts (Navy)	4.266	4.947	0.022
<i>Shirts, aggregate</i>	2.648	2.045	0.860
Shoes (Black)	0.162	0.195	0.020
Shoes (White)	0.118	0.168	0.022
<i>Shoes, aggregate</i>	0.176	0.198	0.052
Sweaters (Air Force)	0.126	0.210	0.022
Sweaters (Army)	0.367	0.182	0.377
Sweaters (Navy)	0.311	0.415	0.022
<i>Sweaters, aggregate</i>	0.270	0.231	0.377

†: The WMW test was inconclusive for this item group.

4 Results on Cost Increases

This section deals with the determination of the causes for the increases in the total cost of the system. The annual costs of each component of the DEU system and their relative contributions to the increased costs of the system are presented in Section 4.1. Results on the increases in the costs of the individual items and item groups are presented in Section 4.2, where tests are also discussed that identify if those item groups that showed changes in demand between the two periods of the DEU system have also had the largest increases in item cost. The results of this section are summarized in Section 4.3. Unless otherwise noted, all costs in this section are specified in Canadian dollars.

4.1 Compound Annual Growth Rates

The annual costs of the DEU system, separated into the costs for initial issues requisitions and the costs for non-initial issues clients, is presented in Table 11. The cost of the items provided as initial issues is also provided as a percentage of the total costs. Also included in the table is the average¹² annual costs of the total DEU system and the initial issues component during both the CUA-based period of the system, and the more recent points-based period.

Note in particular that the total costs have doubled between the periods (a mean difference of 8.5 years), for a CAGR of 7.8%. Moreover, the demand due to initial issues clients has increased at a greater rate than the system as a whole, tripling in cost over this period (a CAGR of 13.6%). When the initial issues clients are excluded from the dataset, the costs of the system have increased with a CAGR of 5.7%. Hence the initial issues clients are responsible for $1.078/1.057 - 1 = 2.0\%$ of the absolute increases in costs of the DEU system.

Table 11: The total costs of the DEU system, separated into costs due to the initial issues, and costs for all other clients, with all associated geometric means and growth rates.

Fiscal Year	Total Costs (M\$)	Costs of the Initial Issues (M\$)	Costs without Initial Issues (M\$)	Initial Issues as a % of Total
1997/1998	11.87	2.79	9.08	23.5%
1998/1999	18.54	3.36	15.18	18.1%
1999/2000	17.90	3.62	14.29	20.2%
2000/2001	16.53	4.25	12.27	25.7%
2006/2007	30.17	8.98	21.19	29.8%
2007/2008	29.69	10.61	19.08	35.7%
2008/2009	31.22	11.36	19.86	36.4%
CUA period	15.97	3.47	12.47	21.7%
Points period	30.35	10.27	20.02	33.8%
CAGR	7.8%	13.6%	5.7%	–

¹²The averages discussed in this section are not simple arithmetic means, but rather geometric means – the reason for this distinction is due to the simplicity in dealing with geometric means when computing growth rates.

The changes in the DEU population were then examined to determine if increases in the population were the cause of the 5.7% increase in the costs of the portion of the demand of DEU items by non-initial issues clients. Table 12 lists the changes in the population of the total number of DEU clients, as well as those that were not initial issues clients. Note that the CAGR of the population of the non-initial issues clients was 0.3% – hence there is a $1.057/1.003 - 1 = 5.4\%$ overall annual increase in the costs of the DEU system not accounted for by the initial issues clients, or by increases in the population of the DEU clients.

Table 12: Populations of the total DEU clients, and initial issue clients in each fiscal year, with associated geometric means and growth rates.

Fiscal Year	Total DEU Population	Non-Initial Issues Clients
1997/1998	61,086	58,114
1998/1999	59,642	56,276
1999/2000	58,351	54,996
2000/2001	57,606	53,746
2006/2007	64,160	56,991
2007/2008	64,838	57,117
2008/2009	65,970	57,690
CUA period	59,157	55,760
Pts period	64,985	57,265
CAGR	1.1%	0.3%

As the costs of the system are only comprised of requisitions of items by the clients, and do not include any administrative costs of the system, the 5.4% overall annual increase in costs not due to initial issues clients or population changes must be due to either increases in demand, or increases in the costs of the individual items. A summary of the contributions to the increases in cost of the DEU system is provided in Table 13. Note that a large fraction (70.0%) of the relative increases in the CAGR of the system is due to reasons other than the changes in composition or size of the population of DEU clients.

Table 13: The absolute and relative contributions to the increases in the costs of the DEU system.

Cause	Contribution to the CAGR	
	Absolute	Relative
Increases in Initial Issues	2.0%	25.9%
Increases in non-Initial Issues Clients	0.3%	4.1%
Other (Increases in Demand or Item cost)	5.4%	70.0%
<i>Total</i>	<i>7.8%</i>	<i>100.0%</i>

4.2 Increases in Item Costs

It was found that the average CAGR of the costs of the individual DEU items was 6.4% over the period studied (1997/98 to 2008/09). However, the increases in the individual item costs varied a great deal across the different item types, with some items actually decreasing in price, whereas others increased by an average of 33% annually.

The range of the increases in the individual item costs is illustrated in a histogram in Figure 8. The solid blue line represents the average increase in the cost of the items (a value of 6.4%, as previously mentioned), and the dashed line represents the median increase in cost (a value of 3.4%).

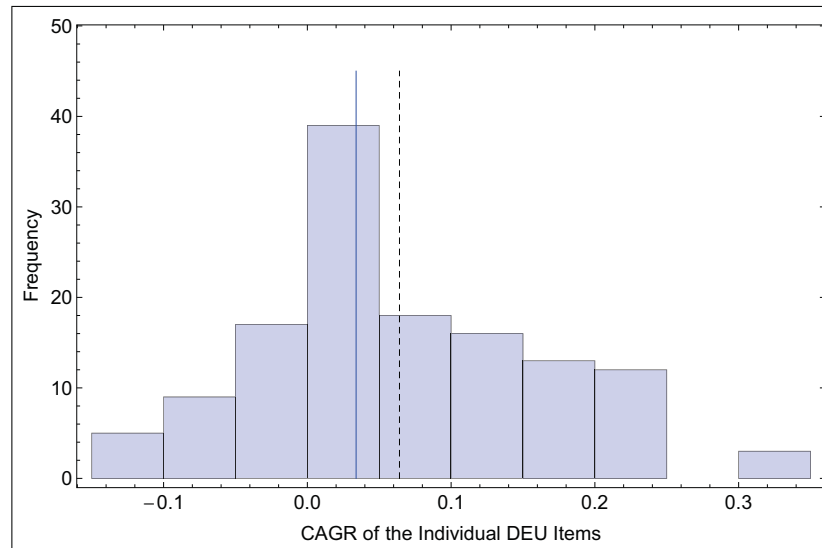


Figure 8: The increases in the individual costs of all DEU items. The solid line represents the median growth rate, and the dashed line represents the mean growth rate.

When the view is restricted to those item groups and aggregate groups studied in Section 3, it was found that the CAGRs for the costs of the grouped items ranged from 0.0% to 18.3%. The average annual increase in these item costs was found to be 7.7%, with a median value of 7.5%. The increases in the costs of the item groups are also provided in the form of a histogram in Figure 9.

The CAGRs of the item groups is presented in Table 14, along with the results of Section 3 specifying the item groups in which statistically significant differences were found in the turnover rates between the CUA-based DEU system and the points-based DEU system (at the $\alpha = 0.05$ level).

As mentioned in Section 2.3.3, the set of CAGRs for the item groups was separated into two subsets: those in which statistically significant differences in the turnover rates were found, and those in which no such differences were found. A WMW test was then performed on these two sets of CAGRs to determine if there was a significant difference in the median CAGRs of these two subsets.

The median CAGR for the item cost of those item groups which showed no increase in per-capita demand was found to be 7.3%, whereas it was found to be 6.5% for those items groups in which

Table 14: The median turnover rates found in each of the two periods, and the results of the statistical tests. Those results with statistically significant differences are highlighted in bold typeface.

Group Description	CAGR of the Item Costs	Stat. Sig. Diff. in Demand
All-Weather Coats (Air Force)	14.6%	No
All-Weather Coats (Army)	18.3%	No
All-Weather Coats (Navy)	13.6%	No
<i>All-Weather Coats, aggregate</i>	16.3%	No
Femoral Wear (Air Force)	5.2%	No
Femoral Wear (Army)	11.3%	No
Femoral Wear (Navy)	5.0%	No
<i>Femoral Wear, aggregate</i>	7.3%	No
Heavyweight Coats (Air Force)	9.6%	No
Lightweight Coats (Air Force)	11.1%	No
Heavyweight Coats (Army)	10.1%	No
Lightweight Coats (Army)	0.0%	— †
Heavyweight Coats (Navy)	11.2%	No
<i>Heavyweight, Lightweight Coats, aggregate</i>	11.0%	No
Raincoats (Air Force)	9.1%	Yes
Raincoats (Army)	5.8%	No
Raincoats (Navy)	6.5%	Yes
<i>Raincoats, aggregate</i>	6.8%	No
Shirts (Air Force)	6.3%	No
Shirts (Army)	2.1%	No
Shirts (Navy)	6.5%	Yes
<i>Shirts, aggregate</i>	4.7%	No
Shoes (Black)	9.0%	Yes
Shoes (White)	4.0%	Yes
<i>Shoes, aggregate</i>	4.5%	No
Sweaters (Air Force)	8.4%	Yes
Sweaters (Army)	0.4%	No
Sweaters (Navy)	2.1%	Yes
<i>Sweaters, aggregate</i>	2.0%	No

†: The statistical test was inconclusive for this item group.

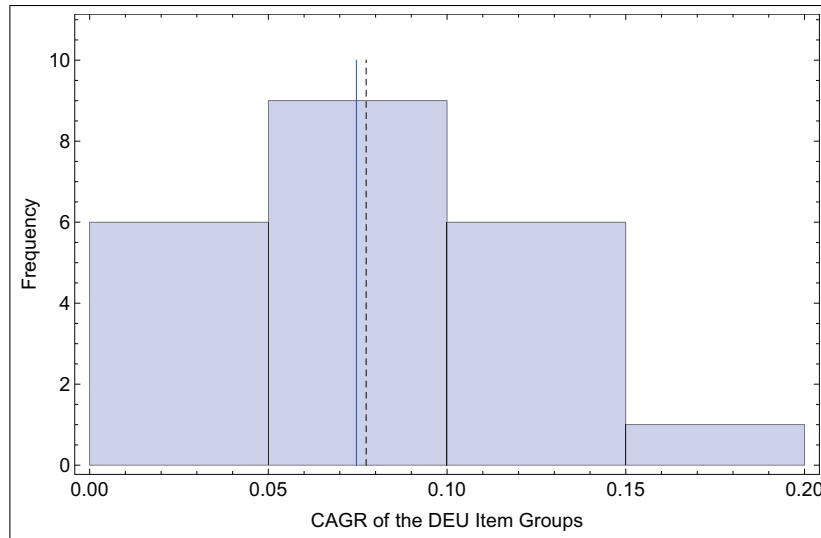


Figure 9: The increases in the individual costs of the items in the groups and aggregate groups studied. The solid line represents the median growth rate, and the dashed line represents the mean growth rate.

such an increase was found. Applying the WMW test to this set of data resulted in not finding a statistically significant difference in the price increases of those items which have had increased per-capita demand versus those which have not, with a p -value of 0.367.

4.3 Summary of the Results on Costs

It was found that changes in the population of the DEU clients have been responsible for approximately 30% of the increases of costs of the DEU system, with the majority due to the increased number of initial issues clients. The remainder of the increases in costs of the system (a growth rate of 5.4%, which is a relative contribution of 70%) is due to either increased demand of the items, or increases in costs of the items themselves. The mean increase in costs of the items was found to be 6.4%, with a median increase of 3.4%, which is consistent with this identified increase (5.4%). Combining this fact with the result that no significant difference was found in the median price increases of those items which have had increased per-capita demand versus those which have not, there is little evidence to conclude that the changes in the demand of the items have been responsible for the increased cost of the system.

It appears that increases in the costs of the items is responsible for the majority of the increases in the costs of the DEU system, with the remainder caused by changes in the population of the DEU clients (which is almost entirely caused by increases in the number of initial issues clients).

5 Conclusions and Recommendations

DMGOR was tasked to examine if the reported difference in the costs of the DEU clothing system is due to increased demand by the DEU clients. The approach taken was to calculate the per-capita turnover rates for several major groups of DEU items in the old system and the new system, and to determine if these rates have changed with any statistical significance.

Using the Wilcoxon-Mann-Whitney test, it was found that there were no significant differences in the turnover rates for any of the seven aggregate groups (e.g., “1: AW Coats”, or “4: Raincoats”), although there were statistically significant differences for several of the individual item groups. Specifically, a statistically significant difference was found between the turnover rates in the periods under the two different DEU systems for 7 of the 29 statistical tests (and a further test was inconclusive). Furthermore, the fraction of the total costs of the DEU system occupied by these items (for which significant differences in the turnover rates were found) was determined, and found to be 31% during the CUA-based period of the DEU system, and 28% during the points-based period of the DEU system. Hence, significant changes in the overall demand of DEU items on a per capita basis were not found to be widespread.

It was found that changes in the population of the DEU clients have been responsible for approximately 30% of the increases of costs of the DEU system, with the majority due to the increased number of initial issues clients. The remainder of the increases in costs of the system (a growth rate of 5.4%, which is a relative contribution of 70%) is due to either increased demand of the items, or increases in costs of the items themselves. The increases in the individual costs of the items was found to be consistent with the identified growth rate of 5.4%. Moreover, no significant difference was found in the median price increases of those items which have had increased per-capita demand versus those which have not. Hence, little evidence was found for increased demand of the items on a per capita basis being responsible for the increased cost of the DEU system.

It was concluded that increases in the costs of the items is largely responsible for the increases in the costs of the DEU system, with the remainder (approximately 30%) caused by changes in the population of the DEU clients (primarily increases in the number of initial issues clients).

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Annex A: Items Provided as Initial Issues

As stated in Section 2.1.4, upon joining one of the services each individual is given a set of DEU items. The types and quantities of items given to each individual is dependent on several characteristics relating to the individual: the member's gender, rank level (Officer or Non-Commissioned Member (NCM)), and service (Navy, Army, or Air Force). The lists of DEU items provided to each of the 12 types of individuals are detailed in Tables A.1 to A.12 below.

Table A.1: *The items provided to female individuals entering the Air Force as NCMs.*

NSN Generic	Description	Quantity
8415-21-914-5192	ATHLETIC SHORTS, UNISEX, GREY	2
1000-21-278-0278	BELT, BLACK	1
8405-20-003-0712	BERET, CF AF BLUE, UNISEX, BELGIAN STYLE	1
8430-20-001-8772	BOOTS, CSA GRADE 1, SAFETY, ANKLE, BLACK	1
8435-20-001-6575	BOOTS, WOMAN'S, COLD WEATHER, BLACK	1
8405-21-899-0781	CAP, GARRISON, BLUE	1
8405-21-904-6699	CAP, KNIT, BLUE	1
8410-21-899-1514	COAT, WOMAN'S, ALL WEATHER, BLUE	1
8415-21-899-2713	DRAWERS, WOMAN'S, EXT COLD WEATHER, WHITE	2
8445-21-874-4317	GLOVES, WOMAN'S, SD, BLACK	1
8410-21-912-7977	JACKET, WOMAN'S, SD, HEAVYWEIGHT, AIR, BLUE	1
8410-21-912-8033	JACKET, WOMAN'S, SD, LIGHTWEIGHT, AIR, BLUE	1
1000-21-280-0280	NECKTIE, BLACK	1
8410-21-913-6868	RAINCOAT, WOMAN'S, NYLON, AIR, BLUE	1
8440-21-899-1180	SCARF, SD, WOOL, BLUE	1
8410-21-912-7817	SHIRT, WOMAN'S, LONG SLEEVES, BLUE	3
8410-21-912-7775	SHIRT, WOMAN'S, SHORT SLEEVES, BLUE	3
8430-20-001-9017	SHOES, ATHLETIC, CROSS-TRAINER, RECRUIT	1
8435-21-914-9832	SHOES, WOMAN'S, CF, OXFORD BLACK	1
8410-21-912-8226	SKIRT, WOMAN'S, SD, HEAVYWEIGHT, AIR, BLUE	1
8410-21-913-5118	SKIRT, WOMAN'S, SD, LIGHTWEIGHT, AIR, BLUE	1
8410-21-912-8139	SLACKS, WOMAN'S, SD, HEAVYWEIGHT, AIR, BLUE	1
8410-21-912-7893	SLACKS, WOMAN'S, SD, LIGHTWEIGHT, AIR, BLUE	1
8440-21-904-0962	SOCKS, SD, BLACK	3
8440-21-904-0049	SOCKS, WOOL/NYLON, GREY	4
8415-21-899-2914	SWEAT PANTS GREY	1
8410-21-921-1529	SWEATER, WOMAN'S, LIGHTWEIGHT WOOL, V-NECK, BLUE	1
8415-21-899-2909	SWEATSHIRT GREY	1
8415-20-000-3425	T-SHIRT, ATHLETE'S, CF, GREY	4
8415-21-899-2718	UNDERSHIRT, WOMAN'S, EXT COLD WEATHER, WHITE	2

Table A.2: The items provided to male individuals entering the Air Force as NCMs.

NSN Generic	Description	Quantity
8415-21-914-5192	ATHLETIC SHORTS, UNISEX, GREY	2
1000-21-278-0278	BELT, BLACK	1
8405-20-003-0712	BERET, CF AF BLUE, UNISEX, BELGIAN STYLE	1
8430-20-001-8772	BOOTS, CSA GRADE 1, SAFETY, ANKLE, BLACK	1
8405-21-899-0781	CAP, GARRISON, BLUE	1
8405-21-904-6699	CAP, KNIT, BLUE	1
8405-21-899-1464	COAT, MAN'S, ALL WEATHER, BLUE	1
8405-21-899-0060	COAT, MAN'S, SD, HEAVYWEIGHT, BLUE	1
8405-21-899-0001	COAT, MAN'S, SD, LIGHTWEIGHT, BLUE	1
8415-21-802-6744	DRAWERS, MAN'S, EXT COLD WEATHER, WHITE	2
8440-21-102-5884	GLOVES, MAN'S, SD, BLACK	1
1000-21-280-0280	NECKTIE, BLACK	1
8430-21-801-2351	OVERSHOES, MAN'S, RUBBER, HIGH, BLACK	1
8405-21-913-6832	RAINCOAT, MAN'S, NYLON, AIR, BLUE	1
8440-21-899-1180	SCARF, SD, WOOL, BLUE	1
8405-21-899-3020	SHIRT, MAN'S, LONG SLEEVES, BLUE	3
8405-20-001-4479	SHIRT, MAN'S, SD, SHORT SLEEVES, AF, LIGHT BLUE	3
8430-20-001-9017	SHOES, ATHLETIC, CROSS-TRAINER, RECRUIT	1
8430-21-914-9528	SHOES, MEN'S, OXFORD, BLACK	1
8440-21-904-0962	SOCKS, SD, BLACK	3
8440-21-904-0049	SOCKS, WOOL/NYLON, GREY	4
8415-21-899-2914	SWEAT PANTS GREY	1
8405-21-921-1540	SWEATER, MAN'S, LIGHTWEIGHT WOOL, V-NECK, BLUE	1
8415-21-899-2909	SWEATSHIRT GREY	1
8405-21-899-0298	TROUSERS, MAN'S, SD, HEAVYWEIGHT, BLUE	2
8405-21-899-0237	TROUSERS, MAN'S, SD, LIGHTWEIGHT, BLUE	2
8415-20-000-3425	T-SHIRT, ATHLETE'S, CF, GREY	4
8415-21-112-2720	UNDERSHIRT, MAN'S, EXT COLD WEATHER, WHITE	2

Table A.3: *The items provided to female individuals entering the Air Force as Officers.*

NSN Generic	Description	Quantity
8415-21-914-5192	ATHLETIC SHORTS, UNISEX, GREY	2
1000-21-278-0278	BELT, BLACK	1
8405-20-003-0712	BERET, CF AF BLUE, UNISEX, BELGIAN STYLE	1
8430-20-001-8772	BOOTS, CSA GRADE 1, SAFETY, ANKLE, BLACK	1
8435-20-001-6575	BOOTS, WOMAN'S, COLD WEATHER, BLACK	1
8405-21-899-0781	CAP, GARRISON, BLUE	1
8405-21-904-6699	CAP, KNIT, BLUE	1
8410-21-899-1514	COAT, WOMAN'S, ALL WEATHER, BLUE	1
8415-21-899-2713	DRAWERS, WOMAN'S, EXT COLD WEATHER, WHITE	2
8445-21-874-4317	GLOVES, WOMAN'S, SD, BLACK	1
8410-21-912-7977	JACKET, WOMAN'S, SD, HEAVYWEIGHT, AIR, BLUE	1
8410-21-912-8033	JACKET, WOMAN'S, SD, LIGHTWEIGHT, AIR, BLUE	1
1000-21-280-0280	NECKTIE, BLACK	1
8410-21-913-6868	RAINCOAT, WOMAN'S, NYLON, AIR, BLUE	1
8440-21-899-1180	SCARF, SD, WOOL, BLUE	1
8410-21-912-7817	SHIRT, WOMAN'S, LONG SLEEVES, BLUE	3
8410-21-912-7775	SHIRT, WOMAN'S, SHORT SLEEVES, BLUE	3
8430-20-001-9017	SHOES, ATHLETIC, CROSS-TRAINER, RECRUIT	1
8435-21-914-9832	SHOES, WOMAN'S, CF, OXFORD BLACK	2
8410-21-912-8226	SKIRT, WOMAN'S, SD, HEAVYWEIGHT, AIR, BLUE	1
8410-21-913-5118	SKIRT, WOMAN'S, SD, LIGHTWEIGHT, AIR, BLUE	1
8410-21-912-8139	SLACKS, WOMAN'S, SD, HEAVYWEIGHT, AIR, BLUE	1
8410-21-912-7893	SLACKS, WOMAN'S, SD, LIGHTWEIGHT, AIR, BLUE	1
8440-21-904-0962	SOCKS, SD, BLACK	3
8440-21-904-0049	SOCKS, WOOL/NYLON, GREY	4
8415-21-899-2914	SWEAT PANTS GREY	1
8410-21-921-1529	SWEATER, WOMAN'S, LIGHTWEIGHT WOOL, V-NECK, BLUE	1
8415-21-899-2909	SWEATSHIRT GREY	1
8415-20-000-3425	T-SHIRT, ATHLETE'S, CF, GREY	4
8415-21-899-2718	UNDERSHIRT, WOMAN'S, EXT COLD WEATHER, WHITE	2

Table A.4: The items provided to male individuals entering the Air Force as Officers.

NSN Generic	Description	Quantity
8415-21-914-5192	ATHLETIC SHORTS, UNISEX, GREY	2
1000-21-278-0278	BELT, BLACK	1
8405-20-003-0712	BERET, CF AF BLUE, UNISEX, BELGIAN STYLE	1
8430-20-001-8772	BOOTS, CSA GRADE 1, SAFETY, ANKLE, BLACK	1
8405-21-899-0781	CAP, GARRISON, BLUE	1
8405-21-904-6699	CAP, KNIT, BLUE	1
8405-21-899-1464	COAT, MAN'S, ALL WEATHER, BLUE	1
8405-21-899-0060	COAT, MAN'S, SD, HEAVYWEIGHT, BLUE	1
8405-21-899-0001	COAT, MAN'S, SD, LIGHTWEIGHT, BLUE	1
8415-21-802-6744	DRAWERS, MAN'S, EXT COLD WEATHER, WHITE	2
8440-21-102-5884	GLOVES, MAN'S, SD, BLACK	1
1000-21-280-0280	NECKTIE, BLACK	1
8430-21-801-2351	OVERSHOES, MAN'S, RUBBER, HIGH, BLACK	1
8405-21-913-6832	RAINCOAT, MAN'S, NYLON, AIR, BLUE	1
8440-21-899-1180	SCARF, SD, WOOL, BLUE	1
8405-21-899-3020	SHIRT, MAN'S, LONG SLEEVES, BLUE	3
8405-20-001-4479	SHIRT, MAN'S, SD, SHORT SLEEVES, AF, LIGHT BLUE	3
8430-20-001-9017	SHOES, ATHLETIC, CROSS-TRAINER, RECRUIT	1
8430-21-914-9528	SHOES, MEN'S, OXFORD, BLACK	2
8440-21-904-0962	SOCKS, SD, BLACK	3
8440-21-904-0049	SOCKS, WOOL/NYLON, GREY	4
8415-21-899-2914	SWEAT PANTS GREY	1
8405-21-921-1540	SWEATER, MAN'S, LIGHTWEIGHT WOOL, V-NECK, BLUE	1
8415-21-899-2909	SWEATSHIRT GREY	1
8405-21-899-0298	TROUSERS, MAN'S, SD, HEAVYWEIGHT, BLUE	2
8405-21-899-0237	TROUSERS, MAN'S, SD, LIGHTWEIGHT, BLUE	2
8415-20-000-3425	T-SHIRT, ATHLETE'S, CF, GREY	4
8415-21-112-2720	UNDERSHIRT, MAN'S, EXT COLD WEATHER, WHITE	2

Table A.5: *The items provided to female individuals entering the Army as NCMs.*

NSN Generic	Description	Quantity
8415-21-914-5192	ATHLETIC SHORTS, UNISEX, GREY	2
1000-21-278-0278	BELT, BLACK	1
8405-20-003-0357	BERET, CF GREEN, UNISEX, BELGIAN STYLE	1
8430-20-001-8772	BOOTS, CSA GRADE 1, SAFETY, ANKLE, BLACK	1
8435-20-001-6575	BOOTS, WOMAN'S, COLD WEATHER, BLACK	1
8405-21-910-8149	CAP, KNIT, GREEN	1
8410-21-905-7284	COAT, WOMAN'S, ALL WEATHER, GREEN	1
8445-21-874-4317	GLOVES, WOMAN'S, SD, BLACK	1
8410-21-912-7949	JACKET, WOMAN'S, SD, HEAVYWEIGHT, LAND, GREEN	1
1000-21-281-0281	NECKTIE, GREEN	1
8410-21-913-6878	RAINCOAT, WOMAN'S, SD, NYLON, LAND, GREEN	1
8440-21-851-2144	SCARF, SD, WOOL, GREEN	1
8410-21-913-5197	SHIRT, WOMAN'S, LONG SLEEVES, GREEN	2
8410-21-913-5300	SHIRT, WOMAN'S, SHORT SLEEVES, GREEN	3
8430-20-001-9017	SHOES, ATHLETIC, CROSS-TRAINER, RECRUIT	1
8435-21-914-9832	SHOES, WOMAN'S, CF, OXFORD BLACK	1
8410-21-912-8254	SKIRT, WOMAN'S, SD, HEAVYWEIGHT, LAND, GREEN	1
8410-21-912-8170	SLACKS, WOMAN'S, SD, HEAVYWEIGHT, LAND, GREEN	2
8440-21-904-0962	SOCKS, SD, BLACK	3
8440-21-904-0049	SOCKS, WOOL/NYLON, GREY	4
8415-21-899-2914	SWEAT PANTS GREY	1
8410-21-920-2411	SWEATER, WOMAN'S, LIGHTWEIGHT WOOL, V-NECK, GREEN	1
8415-21-899-2909	SWEATSHIRT GREY	1
8415-20-000-3425	T-SHIRT, ATHLETE'S, CF, GREY	4

Table A.6: The items provided to male individuals entering the Army as NCMs.

NSN Generic	Description	Quantity
8415-21-914-5192	ATHLETIC SHORTS, UNISEX, GREY	2
1000-21-278-0278	BELT, BLACK	1
8405-20-003-0357	BERET, CF GREEN, UNISEX, BELGIAN STYLE	1
8430-20-001-8772	BOOTS, CSA GRADE 1, SAFETY, ANKLE, BLACK	1
8405-21-910-8149	CAP, KNIT, GREEN	1
8405-21-905-7320	COAT, MAN'S, ALL WEATHER, GREEN	1
8405-21-886-9852	COAT, MAN'S, SD, HEAVYWEIGHT, GREEN	1
8440-21-102-5884	GLOVES, MAN'S, SD, BLACK	1
1000-21-281-0281	NECKTIE, GREEN	1
8430-21-801-2351	OVERSHOES, MAN'S, RUBBER, HIGH, BLACK	1
8405-21-913-6843	RAINCOAT, MAN'S, NYLON, LAND, GREEN	1
8440-21-851-2144	SCARF, SD, WOOL, GREEN	1
8405-21-899-3268	SHIRT, MAN'S, LONG SLEEVES, GREEN	2
8405-21-914-4918	SHIRT, MAN'S, SD, SHORT SLEEVES, GREEN	3
8430-20-001-9017	SHOES, ATHLETIC, CROSS-TRAINER, RECRUIT	1
8430-21-914-9528	SHOES, MEN'S, OXFORD, BLACK	1
8440-21-904-0962	SOCKS, SD, BLACK	3
8440-21-904-0049	SOCKS, WOOL/NYLON, GREY	4
8415-21-899-2914	SWEAT PANTS GREY	1
8405-21-920-2412	SWEATER, MAN'S, LIGHTWEIGHT WOOL, V-NECK , GREEN	1
8415-21-899-2909	SWEATSHIRT GREY	1
8405-21-886-9638	TROUSERS, MAN'S, SD, HEAVYWEIGHT, GREEN	2
8415-20-000-3425	T-SHIRT, ATHLETE'S, CF, GREY	4

Table A.7: *The items provided to female individuals entering the Army as Officers.*

NSN Generic	Description	Quantity
8415-21-914-5192	ATHLETIC SHORTS, UNISEX, GREY	2
1000-21-278-0278	BELT, BLACK	1
8405-20-003-0357	BERET, CF GREEN, UNISEX, BELGIAN STYLE	1
8430-20-001-8772	BOOTS, CSA GRADE 1, SAFETY, ANKLE, BLACK	1
8435-20-001-6575	BOOTS, WOMAN'S, COLD WEATHER, BLACK	1
8405-21-910-8149	CAP, KNIT, GREEN	1
8410-21-905-7284	COAT, WOMAN'S, ALL WEATHER, GREEN	1
8445-21-874-4317	GLOVES, WOMAN'S, SD, BLACK	1
8410-21-912-7949	JACKET, WOMAN'S, SD, HEAVYWEIGHT, LAND, GREEN	1
1000-21-281-0281	NECKTIE, GREEN	1
8410-21-913-6878	RAINCOAT, WOMAN'S, SD,NYLON, LAND, GREEN	1
8440-21-851-2144	SCARF, SD, WOOL, GREEN	1
8410-21-913-5197	SHIRT, WOMAN'S, LONG SLEEVES, GREEN	2
8410-21-913-5300	SHIRT, WOMAN'S, SHORT SLEEVES, GREEN	3
8430-20-001-9017	SHOES, ATHLETIC, CROSS-TRAINER, RECRUIT	1
8435-21-914-9832	SHOES, WOMAN'S, CF, OXFORD BLACK	2
8410-21-912-8254	SKIRT, WOMAN'S, SD, HEAVYWEIGHT, LAND, GREEN	1
8410-21-912-8170	SLACKS, WOMAN'S, SD, HEAVYWEIGHT, LAND, GREEN	2
8440-21-904-0962	SOCKS, SD, BLACK	3
8440-21-904-0049	SOCKS, WOOL/NYLON, GREY	4
8415-21-899-2914	SWEAT PANTS GREY	1
8410-21-920-2411	SWEATER, WOMAN'S, LIGHTWEIGHT WOOL,V-NECK, GREEN	1
8415-21-899-2909	SWEATSHIRT GREY	1
8415-20-000-3425	T-SHIRT, ATHLETE'S, CF, GREY	4

Table A.8: *The items provided to male individuals entering the Army as Officers.*

NSN Generic	Description	Quantity
8415-21-914-5192	ATHLETIC SHORTS, UNISEX, GREY	2
1000-21-278-0278	BELT, BLACK	1
8405-20-003-0357	BERET, CF GREEN, UNISEX, BELGIAN STYLE	1
8430-20-001-8772	BOOTS, CSA GRADE 1, SAFETY, ANKLE, BLACK	1
8405-21-910-8149	CAP, KNIT, GREEN	1
8405-21-905-7320	COAT, MAN'S, ALL WEATHER, GREEN	1
8405-21-886-9852	COAT, MAN'S, SD, HEAVYWEIGHT, GREEN	1
8440-21-102-5884	GLOVES, MAN'S, SD, BLACK	1
1000-21-281-0281	NECKTIE, GREEN	1
8430-21-801-2351	OVERSHOES, MAN'S, RUBBER, HIGH, BLACK	1
8405-21-913-6843	RAINCOAT, MAN'S, NYLON, LAND, GREEN	1
8440-21-851-2144	SCARF, SD, WOOL, GREEN	1
8405-21-899-3268	SHIRT, MAN'S, LONG SLEEVES, GREEN	2
8405-21-914-4918	SHIRT, MAN'S, SD, SHORT SLEEVES, GREEN	3
8430-20-001-9017	SHOES, ATHLETIC, CROSS-TRAINER, RECRUIT	1
8430-21-914-9528	SHOES, MEN'S, OXFORD, BLACK	2
8440-21-904-0962	SOCKS, SD, BLACK	3
8440-21-904-0049	SOCKS, WOOL/NYLON, GREY	4
8415-21-899-2914	SWEAT PANTS GREY	1
8405-21-920-2412	SWEATER, MAN'S, LIGHTWEIGHT WOOL, V-NECK , GREEN	1
8415-21-899-2909	SWEATSHIRT GREY	1
8405-21-886-9638	TROUSERS, MAN'S, SD, HEAVYWEIGHT, GREEN	2
8415-20-000-3425	T-SHIRT, ATHLETE'S, CF, GREY	4

Table A.9: *The items provided to female individuals entering the Navy as NCMs.*

NSN Generic	Description	Quantity
8415-21-914-5192	ATHLETIC SHORTS, UNISEX, GREY	2
1000-21-278-0278	BELT, BLACK	1
1000-21-279-0279	BELT, WHITE	1
8405-20-003-0729	BERET, CF BLACK, UNISEX, BELGIAN STYLE	1
8430-20-001-8772	BOOTS, CSA GRADE 1, SAFETY, ANKLE, BLACK	2
8435-20-001-6575	BOOTS, WOMAN'S, COLD WEATHER, BLACK	1
8405-21-905-7512	CAP, KNIT, BLACK	1
8410-21-899-1550	COAT, WOMAN'S, ALL WEATHER, BLACK	1
8415-21-899-2713	DRAWERS, WOMAN'S, EXT COLD WEATHER, WHITE	2
8445-21-874-4317	GLOVES, WOMAN'S, SD, BLACK	1
8410-21-899-0906	HAT, WOMAN'S, SD, SEA, BLACK AND WHITE	1
8410-21-899-0656	JACKET, WOMAN'S, SD, HEAVYWEIGHT, BLACK	2
1000-21-280-0280	NECKTIE, BLACK	1
8410-21-913-6858	RAINCOAT, WOMAN'S, NYLON, SEA, BLACK	1
8440-21-905-7486	SCARF, SD, POLYESTER, WHITE	1
8440-21-899-1181	SCARF, SD, WOOL, BLACK	1
8410-21-912-7855	SHIRT, WOMAN'S, LONG SLEEVES, WHITE	3
8410-21-912-7754	SHIRT, WOMAN'S, SD, SS, OTHER RANK, WHITE	3
8430-20-001-9017	SHOES, ATHLETIC, CROSS-TRAINER, RECRUIT	1
8435-21-914-9832	SHOES, WOMAN'S, CF, OXFORD BLACK	1
8435-21-914-4932	SHOES, WOMEN'S, OXFORD, SEA, WHITE	1
8410-21-913-5090	SKIRT, WOMAN'S, SD, HEAVYWEIGHT, SEA, BLACK	1
8410-21-913-5146	SKIRT, WOMAN'S, SD, LIGHTWEIGHT, SEA, WHITE	1
8410-21-912-8198	SLACKS, WOMAN'S, SD, HEAVYWEIGHT, SEA, BLACK	1
8410-21-912-8111	SLACKS, WOMAN'S, SD, LIGHTWEIGHT, SEA, WHITE	1
8440-21-899-2180	SOCKS, COTTON/NYLON, WHITE	4
8440-21-904-0962	SOCKS, SD, BLACK	3
8440-21-904-0049	SOCKS, WOOL/NYLON, GREY	4
8415-21-899-2914	SWEAT PANTS GREY	1
8410-20-000-6806	SWEATER, WOMAN'S, BLACK, 100% WOOL, V-NECK	1
8415-21-899-2909	SWEATSHIRT GREY	1
8415-20-000-3425	T-SHIRT, ATHLETE'S, CF, GREY	4
8415-21-899-2718	UNDERSHIRT, WOMAN'S, EXT COLD WEATHER, WHITE	2

Table A.10: *The items provided to male individuals entering the Navy as NCMs.*

NSN Generic	Description	Quantity
8415-21-914-5192	ATHLETIC SHORTS, UNISEX, GREY	2
1000-21-278-0278	BELT, BLACK	1
1000-21-279-0279	BELT, WHITE	1
8405-20-003-0729	BERET, CF BLACK, UNISEX, BELGIAN STYLE	1
8430-20-001-8772	BOOTS, CSA GRADE 1, SAFETY, ANKLE, BLACK	2
8405-21-905-7512	CAP, KNIT, BLACK	1
8405-21-899-0846	CAP, MAN'S, SD, OTHER RANKS, WHITE	1
8405-21-899-1489	COAT, MAN'S, ALL WEATHER, BLACK	1
8405-21-899-0178	COAT, MAN'S, SD, HEAVYWEIGHT, BLACK	2
8415-21-802-6744	DRAWERS, MAN'S, EXT COLD WEATHER, WHITE	2
8440-21-102-5884	GLOVES, MAN'S, SD, BLACK	1
1000-21-280-0280	NECKTIE, BLACK	1
8430-21-801-2351	OVERSHOES, MAN'S, RUBBER, HIGH, BLACK	1
8405-21-913-6821	RAINCOAT, MAN'S, NYLON, SEA, BLACK	1
8440-21-905-7486	SCARF, SD, POLYESTER, WHITE	1
8440-21-899-1181	SCARF, SD, WOOL, BLACK	1
8405-21-899-1070	SHIRT MAN'S, SD, SHORT SLEEVES, OTHER RANKS, WHITE	3
8405-21-899-3128	SHIRT, MAN'S, LONG SLEEVES, WHITE	3
8430-20-001-9017	SHOES, ATHLETIC, CROSS-TRAINER, RECRUIT	1
8430-21-914-9528	SHOES, MEN'S, OXFORD, BLACK	1
8430-21-914-4985	SHOES, MEN'S, OXFORD, SEA, WHITE	1
8440-21-899-2180	SOCKS, COTTON/NYLON, WHITE	4
8440-21-904-0962	SOCKS, SD, BLACK	3
8440-21-904-0049	SOCKS, WOOL/NYLON, GREY	4
8415-21-899-2914	SWEAT PANTS GREY	1
8405-20-000-6790	SWEATER, MAN'S, BLACK, 100% WOOL, V-NECK	1
8415-21-899-2909	SWEATSHIRT GREY	1
8405-21-899-0420	TROUSERS, MAN'S, SD, HEAVYWEIGHT, BLACK	2
8405-21-899-0359	TROUSERS, MAN'S, SD, LIGHTWEIGHT, WHITE	2
8415-20-000-3425	T-SHIRT, ATHLETE'S, CF, GREY	4
8415-21-112-2720	UNDERSHIRT, MAN'S, EXT COLD WEATHER, WHITE	2

Table A.11: *The items provided to female individuals entering the Navy as Officers.*

NSN Generic	Description	Quantity
8415-21-914-5192	ATHLETIC SHORTS, UNISEX, GREY	2
1000-21-278-0278	BELT, BLACK	1
1000-21-279-0279	BELT, WHITE	1
8405-20-003-0729	BERET, CF BLACK, UNISEX, BELGIAN STYLE	1
8430-20-001-8772	BOOTS, CSA GRADE 1, SAFETY, ANKLE, BLACK	1
8435-20-001-6575	BOOTS, WOMAN'S, COLD WEATHER, BLACK	1
8405-21-905-7512	CAP, KNIT, BLACK	1
8410-21-899-1550	COAT, WOMAN'S, ALL WEATHER, BLACK	1
8415-21-899-2713	DRAWERS, WOMAN'S, EXT COLD WEATHER, WHITE	2
8445-21-874-4317	GLOVES, WOMAN'S, SD, BLACK	1
8410-21-899-0906	HAT, WOMAN'S, SD, SEA, BLACK AND WHITE	1
8410-21-899-0656	JACKET, WOMAN'S, SD, HEAVYWEIGHT, BLACK	2
1000-21-280-0280	NECKTIE, BLACK	1
8410-21-913-6858	RAINCOAT, WOMAN'S, NYLON, SEA, BLACK	1
8440-21-905-7486	SCARF, SD, POLYESTER, WHITE	1
8440-21-899-1181	SCARF, SD, WOOL, BLACK	1
8410-21-912-7855	SHIRT, WOMAN'S, LONG SLEEVES, WHITE	3
8410-21-912-8062	SHIRT, WOMAN'S, SD, SHORT SLEEVE, OFFICER, WHITE	3
8430-20-001-9017	SHOES, ATHLETIC, CROSS-TRAINER, RECRUIT	1
8435-21-914-9832	SHOES, WOMAN'S, CF, OXFORD BLACK	2
8435-21-914-4932	SHOES, WOMEN'S, OXFORD, SEA, WHITE	2
8410-21-913-5090	SKIRT, WOMAN'S, SD, HEAVYWEIGHT, SEA, BLACK	1
8410-21-913-5146	SKIRT, WOMAN'S, SD, LIGHTWEIGHT, SEA, WHITE	1
8410-21-912-8198	SLACKS, WOMAN'S, SD, HEAVYWEIGHT, SEA, BLACK	1
8410-21-912-8111	SLACKS, WOMAN'S, SD, LIGHTWEIGHT, SEA, WHITE	1
8440-21-899-2180	SOCKS, COTTON/NYLON, WHITE	4
8440-21-904-0962	SOCKS, SD, BLACK	3
8440-21-904-0049	SOCKS, WOOL/NYLON, GREY	4
8415-21-899-2914	SWEAT PANTS GREY	1
8410-20-000-6806	SWEATER, WOMAN'S, BLACK, 100% WOOL, V-NECK	1
8415-21-899-2909	SWEATSHIRT GREY	1
8415-20-000-3425	T-SHIRT, ATHLETE'S, CF, GREY	4
8415-21-899-2718	UNDERSHIRT, WOMAN'S, EXT COLD WEATHER, WHITE	2

Table A.12: *The items provided to male individuals entering the Navy as Officers.*

NSN Generic	Description	Quantity
8415-21-914-5192	ATHLETIC SHORTS, UNISEX, GREY	2
1000-21-278-0278	BELT, BLACK	1
1000-21-279-0279	BELT, WHITE	1
8405-20-003-0729	BERET, CF BLACK, UNISEX, BELGIAN STYLE	1
8430-20-001-8772	BOOTS, CSA GRADE 1, SAFETY, ANKLE, BLACK	1
8405-21-905-7512	CAP, KNIT, BLACK	1
8405-21-899-0846	CAP, MAN'S, SD, OTHER RANKS, WHITE	1
8405-21-899-1489	COAT, MAN'S, ALL WEATHER, BLACK	1
8405-21-899-0178	COAT, MAN'S, SD, HEAVYWEIGHT, BLACK	2
8415-21-802-6744	DRAWERS, MAN'S, EXT COLD WEATHER, WHITE	2
8440-21-102-5884	GLOVES, MAN'S, SD, BLACK	1
1000-21-280-0280	NECKTIE, BLACK	1
8430-21-801-2351	OVERSHOES, MAN'S, RUBBER, HIGH, BLACK	1
8405-21-913-6821	RAINCOAT, MAN'S, NYLON, SEA, BLACK	1
8440-21-905-7486	SCARF, SD, POLYESTER, WHITE	1
8440-21-899-1181	SCARF, SD, WOOL, BLACK	1
8405-21-899-3128	SHIRT, MAN'S, LONG SLEEVES, WHITE	3
8405-21-899-1801	SHIRT, MAN'S, SD, SHORT SLEEVES, OFFICER WHITE	3
8430-20-001-9017	SHOES, ATHLETIC, CROSS-TRAINER, RECRUIT	1
8430-21-914-9528	SHOES, MEN'S, OXFORD, BLACK	2
8430-21-914-4985	SHOES, MEN'S, OXFORD, SEA, WHITE	2
8440-21-899-2180	SOCKS, COTTON/NYLON, WHITE	4
8440-21-904-0962	SOCKS, SD, BLACK	3
8440-21-904-0049	SOCKS, WOOL/NYLON, GREY	4
8415-21-899-2914	SWEAT PANTS GREY	1
8405-20-000-6790	SWEATER, MAN'S, BLACK, 100% WOOL, V-NECK	1
8415-21-899-2909	SWEATSHIRT GREY	1
8405-21-899-0420	TROUSERS, MAN'S, SD, HEAVYWEIGHT, BLACK	2
8405-21-899-0359	TROUSERS, MAN'S, SD, LIGHTWEIGHT, WHITE	2
8415-20-000-3425	T-SHIRT, ATHLETE'S, CF, GREY	4
8415-21-112-2720	UNDERSHIRT, MAN'S, EXT COLD WEATHER, WHITE	2

Annex B: The Demographics Dataset

As stated in Section 2.1.5, DGMPRA staff provided the assorted demographical information on the CF used in this study. More specifically, they provided information on the total number of DEU clients, which is simply the number of personnel in each service; and the number of initial issues clients, which is the sum of the number of new recruits in each service, and the total number of changes into each service. This data was provided aggregated by fiscal year for data starting with the 1996/97 fiscal year, and terminating with the 2009/10 fiscal year, separated by service and rank level. Each of these three segments of the dataset are presented in Tables B.1 to B.3 below.

Table B.1: The number of new recruits in the CF, separated by service and rank level.

		New Recruits in Fiscal Year						
Rank Level	Environment	CUA-based DEU system				points-based DEU system		
		1997/98	1998/99	1999/00	2000/01	2006/07	2007/08	2008/09
NCM	Air Force	275	61	190	428	1,032	1,239	1,387
	Army	1,724	1,744	1,501	1,721	3,977	4,135	4,315
	Navy	277	276	318	472	625	664	743
Officer	Air Force	255	273	236	240	494	444	454
	Army	226	364	303	323	640	608	631
	Navy	125	117	122	107	205	232	294
<i>Total</i>		2,882	2,835	2,670	3,291	6,973	7,322	7,824

Table B.2: The number of personnel changing services in the CF, separated by service and rank level.

		Personnel Changing Services in Fiscal Year						
Rank Level	Environment	CUA-based DEU system				points-based DEU system		
		1997/98	1998/99	1999/00	2000/01	2006/07	2007/08	2008/09
NCM	Air Force	26	118	143	119	78	184	195
	Army	24	201	196	308	35	85	108
	Navy	13	186	281	56	24	27	57
Officer	Air Force	11	7	25	20	33	42	44
	Army	10	12	24	39	20	40	27
	Navy	6	7	16	27	6	21	25
<i>Total</i>		90	531	685	569	196	399	456

Table B.3: The number of personnel in the CF, separated by service and rank level.

Rank Level		Number of Personnel in the CF in Fiscal Year						
		CUA-based DEU system				points-based DEU system		
		1997/98	1998/99	1999/00	2000/01	2006/07	2007/08	2008/09
NCM	Air Force	16,216	15,172	14,104	13,176	13,446	13,573	13,701
	Army	23,182	23,077	22,842	23,072	27,196	27,658	28,435
	Navy	8,594	8,368	8,370	8,297	8,500	8,236	8,142
Officer	Air Force	5,873	5,776	5,713	5,609	6,133	6,256	6,304
	Army	4,714	4,764	4,817	4,936	6,122	6,296	6,461
	Navy	2,507	2,485	2,505	2,516	2,763	2,819	2,927
<i>Total</i>		61,086	59,642	58,351	57,606	64,160	64,838	65,970

Annex C: The Item Groups

As described in Section 2.2, the items studied were combined into various groups, as several DEU items fulfill the same role and may be used interchangeably. Furthermore, these item groups were consolidated into 7 larger groups (called *Aggregate Groups*), in order to study the changes in turnover rates across the entire CF instead of within one specific environment.

Tables C.1 to C.7 provide lists of the items within each one of the aggregate groups. Moreover, each list is separated into the component item groups within each aggregate group.

Table C.1: *The items in aggregate group 1: AW Coats.*

Group Index	Log#	NSN Generic	Description
1	43	8405-21-899-1464	COAT, MAN'S, ALL WEATHER, BLUE
	102	8410-21-899-1514	COAT, WOMAN'S, ALL WEATHER, BLUE
2	56	8405-21-905-7320	COAT, MAN'S, ALL WEATHER, GREEN
	131	8410-21-905-7284	COAT, WOMAN'S, ALL WEATHER, GREEN
3	44	8405-21-899-1489	COAT, MAN'S, ALL WEATHER, BLACK
	103	8410-21-899-1550	COAT, WOMAN'S, ALL WEATHER, BLACK

Table C.2: The items in aggregate group 2: Femoral Wear.

Group Index	Log#	NSN Generic	Description
4	25	8405-21-899-0237	TROUSERS, MAN'S, SD, LIGHTWEIGHT, BLUE
	26	8405-21-899-0298	TROUSERS, MAN'S, SD, HEAVYWEIGHT, BLUE
	85	8410-21-899-0531	SKIRT, WOMAN'S, SERVICE DRESS, BLUE, LIGHTWEIGHT
	86	8410-21-899-0556	SKIRT, WOMAN'S, SERVICE DRESS, BLUE, HEAVYWEIGHT
	87	8410-21-899-0581	SLACKS, WOMAN'S, SERVICE DRESS, BLUE, LIGHTWEIGHT
	88	8410-21-899-0606	SLACKS, WOMAN'S, SERVICE DRESS, BLUE, HEAVYWEIGHT
	181	8410-21-912-7893	SLACKS, WOMAN'S, SD, LIGHTWEIGHT, AIR, BLUE
	184	8410-21-912-8139	SLACKS, WOMAN'S, SD, HEAVYWEIGHT, AIR, BLUE
	192	8410-21-912-8226	SKIRT, WOMAN'S, SD, HEAVYWEIGHT, AIR, BLUE
	193	8410-21-913-5118	SKIRT, WOMAN'S, SD, LIGHTWEIGHT, AIR, BLUE
5	16	8405-21-886-9638	TROUSERS, MAN'S, SD, HEAVYWEIGHT, GREEN
	19	8405-21-893-5557	TROUSERS, MAN'S, SERVICE DRESS, TAN, LIGHTWEIGHT
	76	8410-21-887-9117	SLACKS, WOMAN'S, SERVICE DRESS, GREEN, HEAVYWEIGHT
	77	8410-21-887-9139	SKIRT, WOMAN'S, SERVICE DRESS, GREEN, HEAVYWEIGHT
	79	8410-21-893-5617	SKIRT, WOMAN'S, SERVICE DRESS, TAN, LIGHTWEIGHT
	80	8410-21-893-5642	SLACKS, WOMAN'S, SERVICE DRESS, TAN, LIGHTWEIGHT
	183	8410-21-912-8170	SLACKS, WOMAN'S, SD, HEAVYWEIGHT, LAND, GREEN
	190	8410-21-912-8254	SKIRT, WOMAN'S, SD, HEAVYWEIGHT, LAND, GREEN
6	27	8405-21-899-0359	TROUSERS, MAN'S, SD, LIGHTWEIGHT, WHITE
	28	8405-21-899-0420	TROUSERS, MAN'S, SD, HEAVYWEIGHT, BLACK
	90	8410-21-899-0681	SKIRT, WOMAN'S, SERVICE DRESS, WHITE, LIGHTWEIGHT
	91	8410-21-899-0706	SKIRT, WOMAN'S, SERVICE DRESS, BLACK, HEAVYWEIGHT
	92	8410-21-899-0731	SLACKS, WOMAN'S, SERVICE DRESS, WHITE, LIGHTWEIGHT
	93	8410-21-899-0756	SLACKS, WOMAN'S, SERVICE DRESS, BLACK, HEAVYWEIGHT
	182	8410-21-912-8111	SLACKS, WOMAN'S, SD, LIGHTWEIGHT, SEA, WHITE
	185	8410-21-912-8198	SLACKS, WOMAN'S, SD, HEAVYWEIGHT, SEA, BLACK
	194	8410-21-913-5090	SKIRT, WOMAN'S, SD, HEAVYWEIGHT, SEA, BLACK
	195	8410-21-913-5146	SKIRT, WOMAN'S, SD, LIGHTWEIGHT, SEA, WHITE

Table C.3: The items in aggregate group 3: HW, LW Coats.

Group Index	Log#	NSN Generic	Description
7	23	8405-21-899-0060	COAT, MAN'S, SD, HEAVYWEIGHT, BLUE
	84	8410-21-899-0506	JACKET, WOMAN'S, SERVICE DRESS, BLUE, HEAVYWEIGHT
	188	8410-21-912-7977	JACKET, WOMAN'S, SD, HEAVYWEIGHT, AIR, BLUE
8	22	8405-21-899-0001	COAT, MAN'S, SD, LIGHTWEIGHT, BLUE
	83	8410-21-899-0481	JACKET, WOMAN'S, SERVICE DRESS, BLUE, LIGHTWEIGHT
	189	8410-21-912-8033	JACKET, WOMAN'S, SD, LIGHTWEIGHT, AIR, BLUE
9	17	8405-21-886-9852	COAT, MAN'S, SD, HEAVYWEIGHT, GREEN
	75	8410-21-887-9093	JACKET WOMAN'S, SERVICE DRESS, GREEN, HEAVYWEIGHT
	186	8410-21-912-7949	JACKET, WOMAN'S, SD, HEAVYWEIGHT, LAND, GREEN
10	187	8410-21-912-8005	JACKET, WOMAN'S, SD, LIGHTWEIGHT, LAND, TAN
	18	8405-21-893-5473	COAT, MAN'S, SERVICE DRESS, TAN, LIGHTWEIGHT
	78	8410-21-893-5532	JACKET, WOMAN'S, SERVICE DRESS, TAN, LIGHTWEIGHT
11	24	8405-21-899-0178	COAT, MAN'S, SD, HEAVYWEIGHT, BLACK
	89	8410-21-899-0656	JACKET, WOMAN'S, SD, HEAVYWEIGHT, BLACK

Table C.4: The items in aggregate group 4: Raincoats.

Group Index	Log#	NSN Generic	Description
12	40	8405-21-899-1134	RAINCOAT, MAN'S, BLUE
	96	8410-21-899-1160	RAINCOAT, WOMAN'S, BLUE
	174	8405-21-913-6832	RAINCOAT, MAN'S, NYLON, AIR, BLUE
	177	8410-21-913-6868	RAINCOAT, WOMAN'S, NYLON, AIR, BLUE
13	15	8405-21-879-9444	RAINCOAT, MAN'S, GREEN
	173	8405-21-913-6843	RAINCOAT, MAN'S, NYLON, LAND, GREEN
	176	8410-21-913-6878	RAINCOAT, WOMAN'S, SD, NYLON, LAND, GREEN
14	41	8405-21-899-1147	RAINCOAT, MAN'S, BLACK
	97	8410-21-899-1170	RAINCOAT, WOMAN'S, BLACK
	175	8405-21-913-6821	RAINCOAT, MAN'S, NYLON, SEA, BLACK
	178	8410-21-913-6858	RAINCOAT, WOMAN'S, NYLON, SEA, BLACK

Table C.5: The items in aggregate group 5: Shirts.

Group Index	Log#	NSN Generic	Description
15	38	8405-21-899-1058	SHIRT, MAN'S, SD,SHORT SLEEVES, BLUE
	46	8405-21-899-1831	SHIRT, MAN, BASE DRESS, LONG SLEEVES, POSTMAN BLUE
	47	8405-21-899-3020	SHIRT, MAN'S, LONG SLEEVES, BLUE
	99	8410-21-899-1236	SHIRT, WOMAN'S, LONG SLEEVES, BLUE
	100	8410-21-899-1288	SHIRT, WOMAN'S, SHORT SLEEVES, BLUE
	110	8410-21-899-3391	SHIRT, BASE DRESS, WOMEN'S, LS, POSTMAN BLUE
	165	8410-21-912-7775	SHIRT, WOMAN'S, SHORT SLEEVES, BLUE
	170	8410-21-912-7817	SHIRT, WOMAN'S, LONG SLEEVES, BLUE
	316	8405-20-001-4479	SHIRT, MAN'S, SD, SHORT SLEEVES, AF, LIGHT BLUE
16	50	8405-21-899-3268	SHIRT, MAN'S, LONG SLEEVES, GREEN
	98	8410-21-899-1184	SHIRT, WOMAN'S, LONG SLEEVES, GREEN
	168	8410-21-913-5300	SHIRT, WOMAN'S, SHORT SLEEVES, GREEN
	172	8410-21-913-5197	SHIRT, WOMAN'S, LONG SLEEVES, GREEN
	209	8405-21-914-4918	SHIRT, MAN'S, SD, SHORT SLEEVES, GREEN
17	39	8405-21-899-1070	SHIRT, MEN'S, SD,SHORT SLEEVES, OTHER RANKS, WHITE
	45	8405-21-899-1801	SHIRT, MAN'S, SD,SHORT SLEEVES, OFFICER WHITE
	48	8405-21-899-3128	SHIRT, MAN'S, LONG SLEEVES, WHITE
	95	8410-21-899-1082	SHIRT, WOMAN'S, LONG SLEEVES, WHITE
	101	8410-21-899-1306	SHIRT, WOMAN'S, SHORT SLEEVES, OTHER RANKS, WHITE
	104	8410-21-899-1813	SHIRT, WOMAN'S, SHORT SLEEVES, OFFICERS, WHITE
	166	8410-21-912-7754	SHIRT, WOMAN'S, SD, SS, OTHER RANK, WHITE
	167	8410-21-912-8062	SHIRT, WOMAN'S, SD, SHORT SLEEVE, OFFICER, WHITE
	171	8410-21-912-7855	SHIRT, WOMAN'S, LONG SLEEVES, WHITE
	239	8415-21-896-8382	SHIRT, NAVAL COMBAT, BLUE
1051	8415-20-004-6599	SHIRT, UNISEX, LONG SLEEVE, NAVAL COMBAT, SEA	

Table C.6: The items in aggregate group 6: Shoes.

Group Index	Log#	NSN Generic	Description
18	139	8430-21-904-6712	SHOES, MEN'S, OXFORD, WHITE
	141	8435-21-904-6985	SHOES, WOMAN'S, OXFORD, WHITE
	228	8430-21-914-4985	SHOES, MEN'S, OXFORD, SEA, WHITE
	229	8435-21-914-4932	SHOES, WOMAN'S, OXFORD, SEA, WHITE
19	136	8430-21-860-7169	SHOES, MEN'S, OXFORD, BLACK
	140	8435-21-888-7319	SHOES, WOMAN'S, OXFORD, BLACK
	219	8435-21-914-9832	SHOES, WOMAN'S, CF, OXFORD BLACK
	220	8430-21-914-9528	SHOES, MEN'S, OXFORD, BLACK

Table C.7: *The items in aggregate group 7: Sweaters.*

Group Index	Log#	NSN Generic	Description
20	51	8405-21-904-0646	SWEATER, WOOL, V NECK, BLUE
	213	8410-21-913-5183	PULLOVER, V NECK, AIR FORCE BLUE
	259	8410-21-921-1529	SWEATER, WOMAN'S, LIGHTWEIGHT WOOL, V-NECK, BLUE
	260	8405-21-921-1540	SWEATER, MAN'S, LIGHTWEIGHT WOOL, V-NECK, BLUE
21	14	8405-21-878-1578	SWEATER, DARK GREEN, CREW NECK, MANS PULLOVER
	215	8410-21-913-5190	PULLOVER, CREW NECK, DARK GREEN
	233	8405-21-920-2412	SWEATER, MAN'S, LIGHTWEIGHT WOOL, V-NECK , GREEN
	245	8410-21-920-2411	SWEATER, WOMAN'S, LIGHTWEIGHT WOOL, V-NECK, GREEN
22	52	8405-21-904-0792	SWEATER, MAN'S, WOOL, V NECK, RIB KNIT, BLACK
	214	8410-21-913-5176	SWEATER, WOMAN'S, WOOL, V NECK, RIB KNIT, BLACK
	285	8405-20-000-6790	SWEATER, MAN'S, BLACK, 100% WOOL, V-NECK
	286	8410-20-000-6806	SWEATER, WOMAN'S, BLACK, 100% WOOL, V-NECK
	312	8405-21-893-5257	SWEATER, CMC WHITE PULLOVER

List of Acronyms & Abbreviations

ADM(Mat)	Assistant Deputy Minister (Materiel)
AW	All-Weather
CAGR	Compound Annual Growth Rate
CF	Canadian Forces
CIC	Cadet Instructors Cadre
CORA	Centre for Operational Research and Analysis
COS(Mat)	Chief of Staff Assistant Deputy Minister (Materiel)
CUA	Clothing Upkeep Allowance
DCOS(Mat)	Deputy Chief of Staff Assistant Deputy Minister (Materiel)
DEU	Distinctive Environmental Uniform
DGMPRA	Director General Military Personnel Research and Analysis
DMGOR	Directorate of Materiel Group Operational Research
DND	Department of National Defence
DRDC	Defence Research and Development Canada
DRO GM	Direction de la recherche opérationnelle - groupe des matériaux
DSSPM	Director Soldier System Project Management
FC	Forces canadiennes
HW	Heavyweight
IEH	Indemnité d'entretien de l'habillement
JCOR	Joint and Common OR
LW	Lightweight
NCM	Non-commissioned member
NDHQ	National Defence Headquarters
SCEM MAT	Sous-chef d'état-major - (Matériel)
SD	Service Dress
TCAC	Taux de croissance annuel composé
UDE	Uniforme distinctif d'élément
WMW	Wilcoxon-Mann-Whitney

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In 2005, the Canadian Forces (CF) changed the way Regular Force members acquire *Distinctive Environmental Uniform* (DEU) items: a monthly monetary allowance, known as the *Clothing Upkeep Allowance* (CUA), was replaced with a clothing replacement system based on the individual accrual of points. The costs of the DEU clothing system have increased in the years since its change from the CUA-based system to the points-based system. The Directorate of Materiel Group Operational Research (DMGOR) was tasked in September 2009 by the Deputy Chief of Staff Materiel (DCOS(Mat)) to examine if the reported difference in the costs of the DEU clothing system is due to increased demand by the DEU clients.

Per-capita turnover rates were calculated for several major groups of DEU items in the old system and the new system, and for each it was determined if these rates have changed with any statistical significance using Wilcoxon-Mann-Whitney tests. Statistically significant differences were found between the turnover rates in the time periods under the two different DEU systems for 7 of the 29 groups of items studied (and a further test was inconclusive). Hence, significant changes in the overall demand of DEU items on a per capita basis were not found to be widespread.

With respect to costs of the system, it was found that changes in the population of the DEU clients have been responsible for approximately 30% of the increases of costs of the DEU system, with the majority due to the increased number of initial issues clients – personnel newly entering service (either as new recruits, or upon changing services). Increases in the individual costs of the items were found to be consistent with the identified growth rate of 5.4% when the size and nature of the DEU client population was removed as a factor. No significant difference was found in the median price increases of those items which have had increased per-capita demand versus those which have not. It was concluded that there is little evidence that increased demand of the items on a per capita basis is responsible for the increases in the costs of the DEU system.

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